ENGINEERING NEWS-RECORD

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Architect Wright and his Guggenheim Museum *p. 42 and p. 108*

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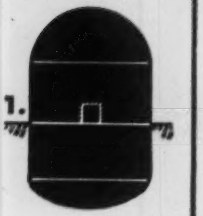

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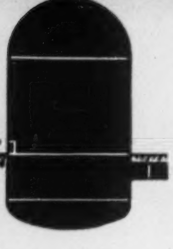

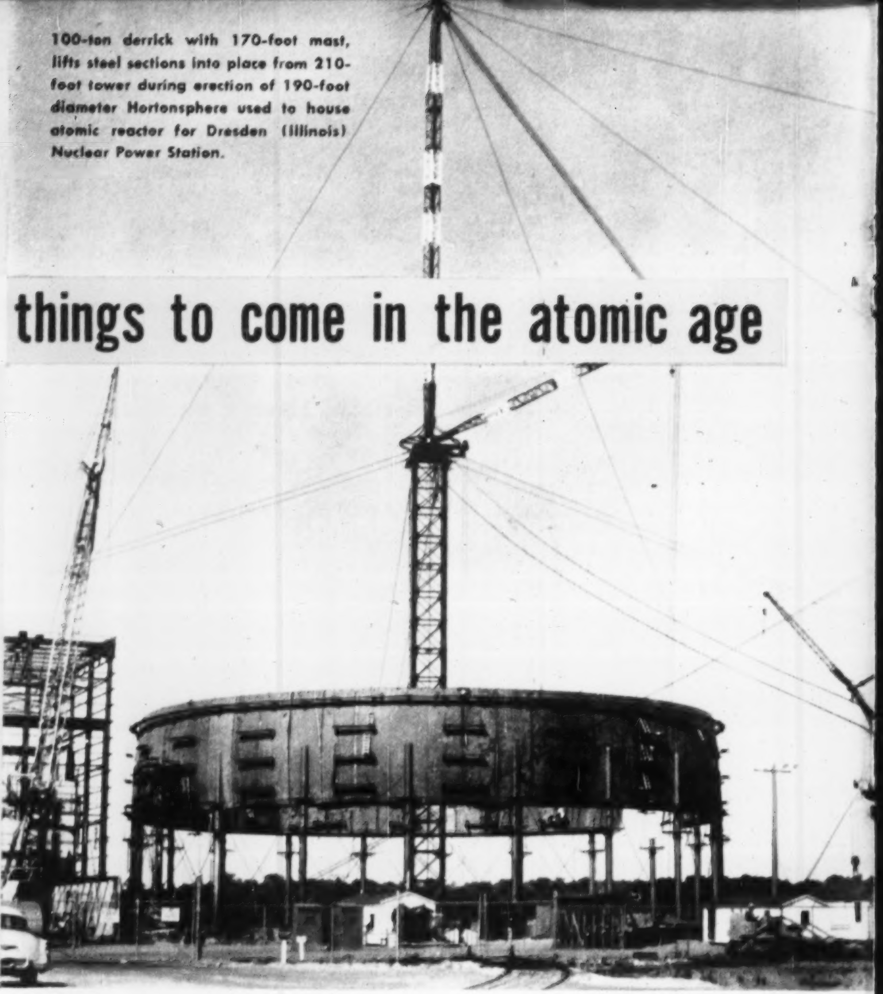

100-ton derrick with 170-foot mast, lifts steel sections into place from 210-foot tower during erection of 190-foot diameter Hortonsphere used to house atomic reactor for Dresden (Illinois) Nuclear Power Station.

SHAPES OF things to come in the atomic age

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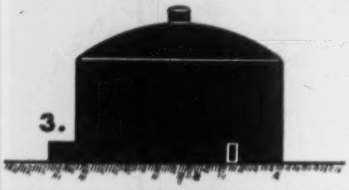

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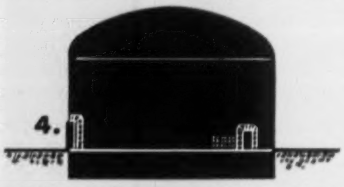

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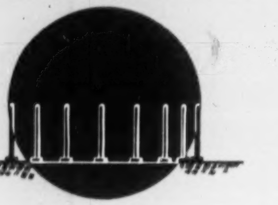

CB&I Structures to Silhouette Major Reactor Projects

For CB&I engineers, fabricators and erection specialists, the challenge of things to come in the atomic age is, to a large extent, a reflection of existing accomplishments.

In 1954 the world's largest sphere, a Hortonsphere® measuring 225 feet in diameter, was built by CB&I for the AEC Knoll Atomic Power Laboratory at West Milton, New York, for testing a prototype of the atomic power plant which now serves our atom sub fleet.

Today, near Chicago, a skilled CB&I crew is completing the erection of a 190-foot diameter Hortonsphere to house an atomic reactor for the Dresden Nuclear Power Station. Near Detroit, another CB&I crew erected a reactor containment vessel of a different design for the Enrico Fermi Atomic Power Plant. Silhouettes of similar structures, being designed, fabricated or erected by CB&I, are shown here.

Yes, for CB&I, the shape of things to come in an atomic tomorrow had their beginnings *yesterday*. Experience gained in almost 70 years of furnishing *craftsmanship in steel* to serve Industry, Government and scientific research is now meeting the exacting requirements for reactor containment vessels.

E53CB

1. Enrico Fermi Atomic Power Plant, Lagoona Beach, Michigan. (Power Reactor Development Co., Architect-Engineers)

2. U. S. Air Force, Dayton, Ohio

3. Atomic Energy Commission, Livermore, California. (John W. Cowper, Purchaser)

4. Massachusetts Institute of Technology, Cambridge, Massachusetts. (Foster Wheeler Corp., Engineers)

5. Dresden Nuclear Power Station, Dresden, Illinois. (Bechtel Corp., Constructor-Contractor)

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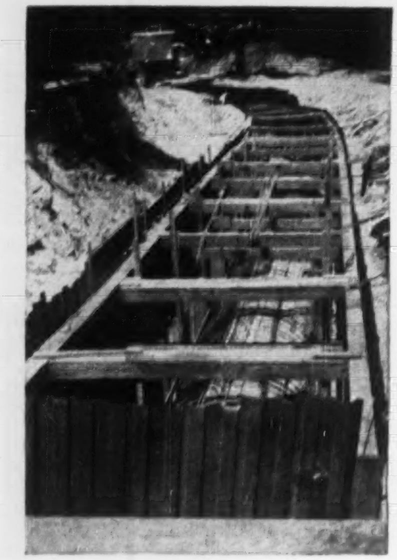

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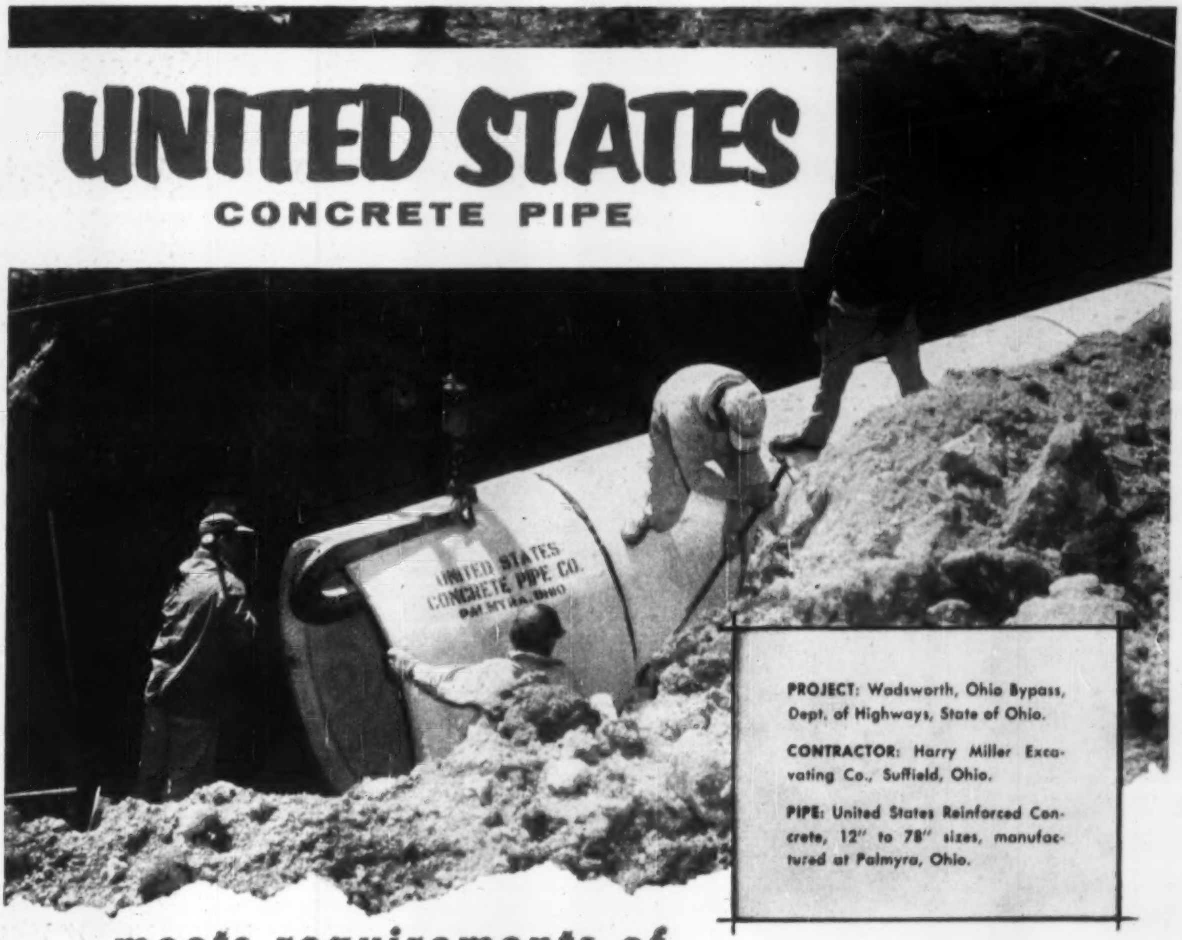

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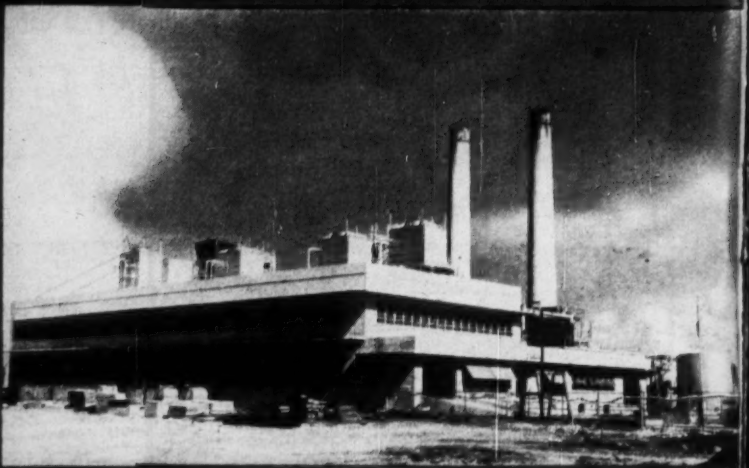


POWER PLANTS Raymond installed the foundations for the power plant at the left in California while the power plant above, located in Puerto Rico, was completely constructed by Raymond.

OIL Tanker pier in Australia (above) is another example of Raymond's complete construction services outside the United States. Typical of foundation work in this country is the Raymond supported refinery (bottom) in Toledo, Ohio.

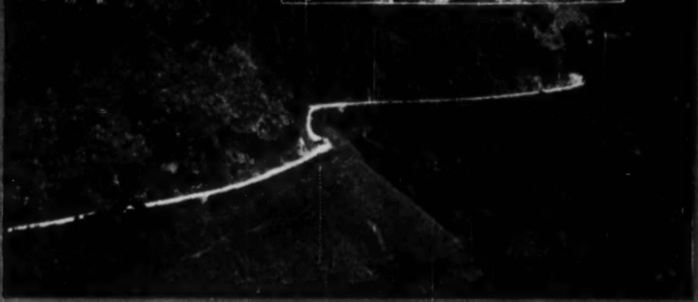
Raymond

THE COMPANY THAT LEADS A DOUBLE LIFE

FOR 60 YEARS, we have been recognized as one of the country's leaders in foundation work. While it's true we have completed more than 30,000 foundation and soil investigation contracts for important industrial and civic structures during this time, this represents only one part of our large scope of activities. In this country we also handle marine and heavy construction as well.

And abroad, Raymond provides a *complete* service for every type of general construction . . . from engineering studies and planning to the actual building of dams, power plants, oil refineries, housing, highways and hospitals.

This all began when we, as a pioneer in foreign construction work, *HIGHWAYS* *Our foundation experience plays an important part in the country's mushrooming highway program as evidenced by the work on the New Jersey Turnpike (right). In South America (below), Raymond engineers are playing a major role in Columbia's new network of highways.*



BUILDINGS *Above is a Raymond-built hospital in Venezuela while the bank building in Atlanta, Ga. is supported by our foundations—both excellent examples of Raymond's diversified activities.*

FULTON
FULTON

RAYMOND

specializes in foundation installations at home . . . and general construction abroad.

BRIDGES *Cuban bridge (above left) is an outstanding example of Raymond's complete construction services abroad. The Lake Pontchartrain Bridge (above right), world's longest over water bridge, rests on Raymond Concrete Cylinder Piles.*

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We cordially invite both governments and private industry to let us apply our skills for foundation, marine or heavy construction work here in the United States, or any type of general construction abroad.

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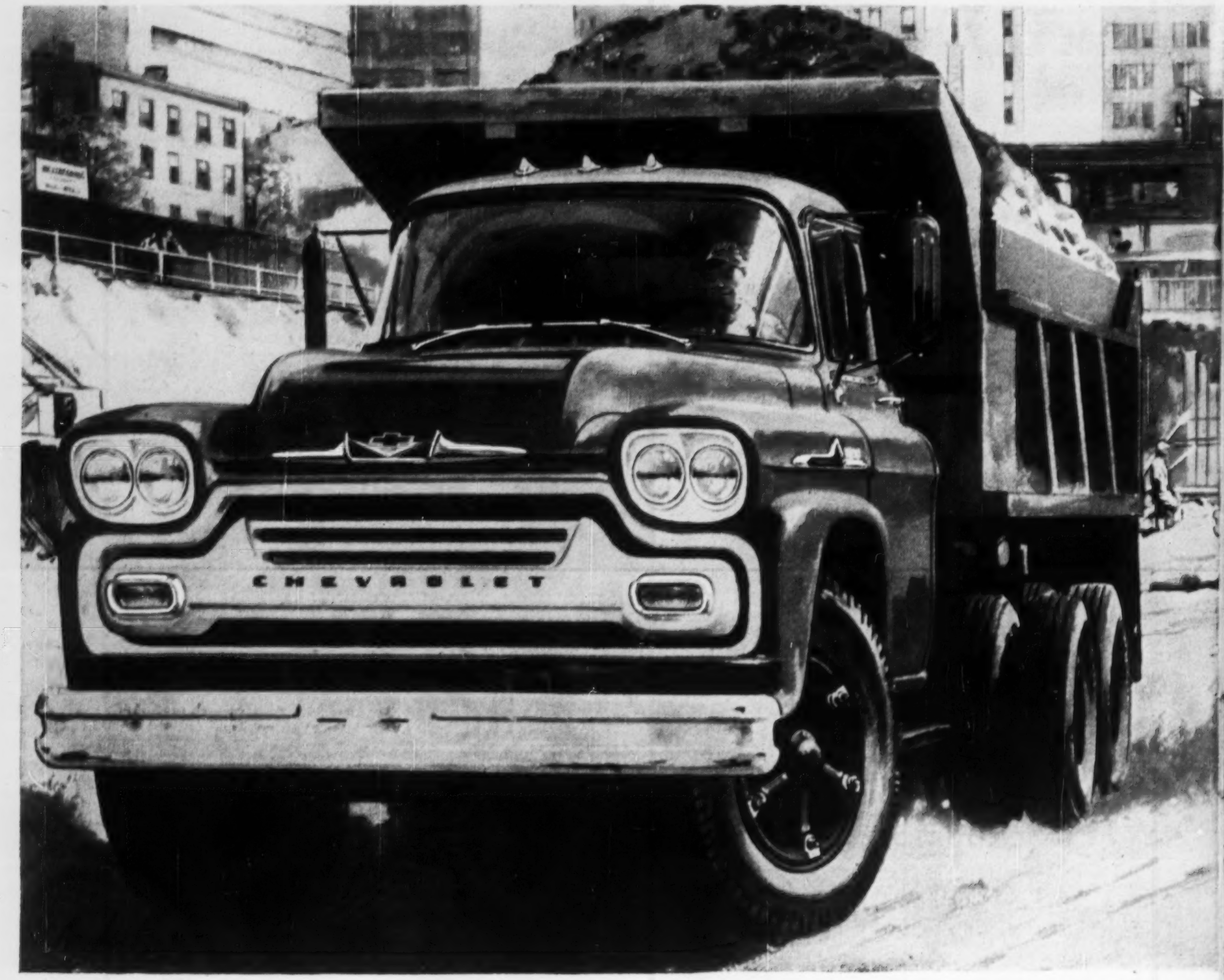

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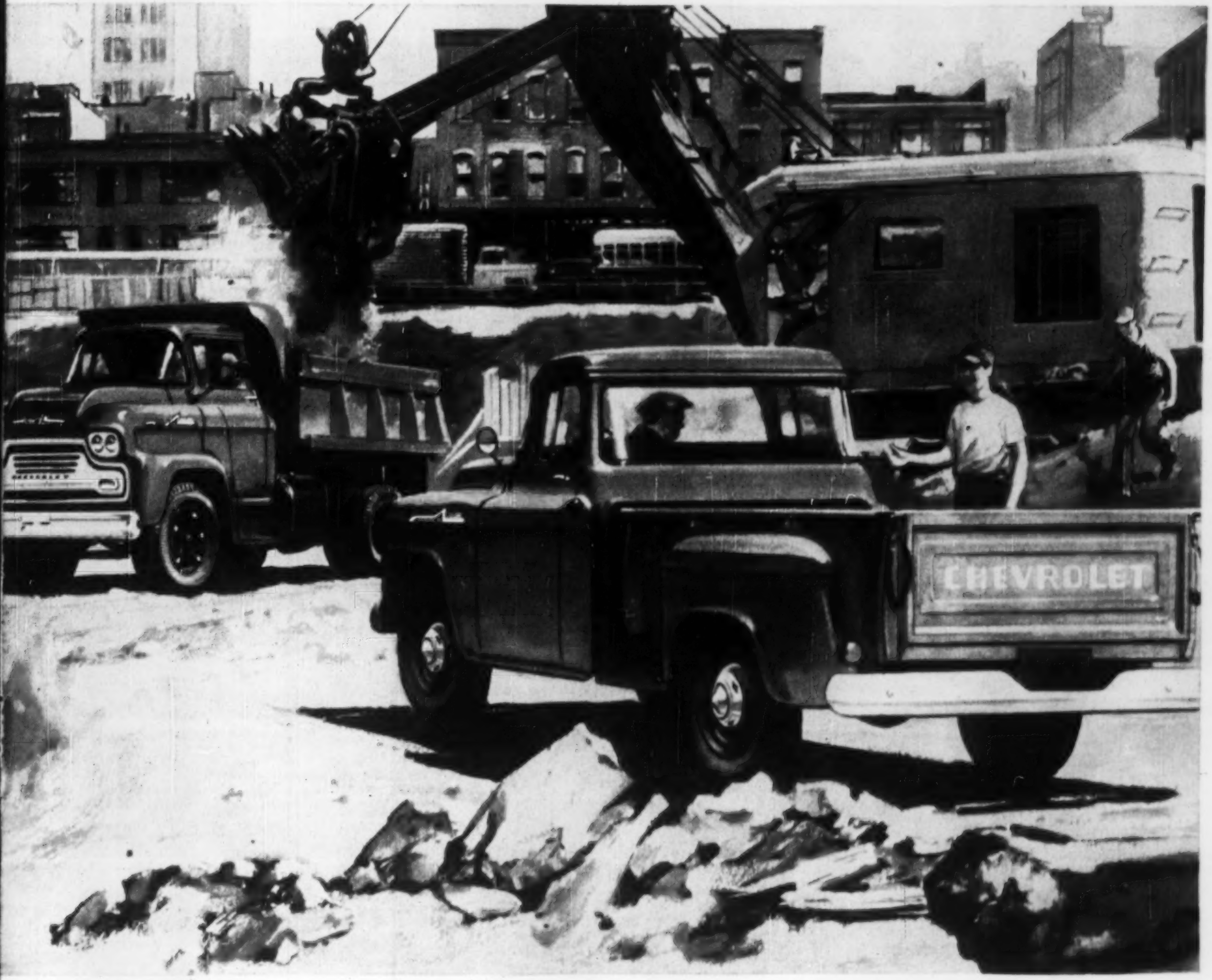
New Chevrolet trucks bring you higher efficiency horsepower right up the line, including a revolutionary new V8 development for heavyweights. Here are engines designed to work for you . . . to save for you . . . to give you more power than ever before!

If you use light-duty trucks, there's new standard power in every '58 Chevy model . . . a more powerful (145-h.p.!) edition of the engine most famous for economy and dependability, the rugged Thriftmaster 6. And the optional (extra-cost) Trademaster V8 is *all new* and all set to go to work with 160 h.p., 283 cubic inches of displacement, short-stroke efficiency and weight-saving compactness.

Chevrolet for '58 is here with new medium- and heavy-duty power, too! Standard in Series 50 L.C.F. models is a new version of the Heavy-Duty Taskmaster V8, with plenty of power for fleet hauling and new durability features such as Stellite-faced exhaust valves and induction-hardened exhaust valve seats. Series 60 models provide the time-proved Jobmaster 6 with more power than

CHEVROLET

NEW CHEVROLET

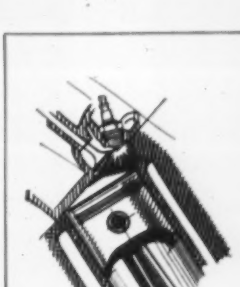


MEDIUM, AND HEAVY-DUTY HAULERS

ever—150 h.p.—and a host of new features that mean more economy and dependability on jobs that work a truck hard.

And Series 70 and 80 models come equipped with a big 175-h.p. Heavy-Duty Super Taskmaster V8 newly fitted out with a lineup of advanced, rugged components; this engine is designed to pull mammoth payloads with ease.

But that's not all! Series 90 and 100 models offer a *new kind* of big truck engine, the 230-h.p. Workmaster V8, with radical Wedge-Head design that develops high power and torque at fuel-saving low r.p.m. See your nearby Chevrolet dealer and *save* with Chevy's new brand of hustle! . . . Chevrolet Division of General Motors, Detroit 2, Michigan.



RADICAL NEW WEDGE-HEAD DESIGN

In the Workmaster V8, a new kind of combustion chamber gets *extra power* with top economy from regular grade fuel! Cylinder block is machined at 16-degree slant, pistons are of new "peaked" design.

Latest editions of the "Big Wheel" in trucks

TASK · FORCE 58 TRUCKS

CTC Beams Are Too Thin

SIR—In ENR Oct. 17, p. 326, an article shows an alleged cost contrast between the AASHO-PCI standard prestressed concrete I beams and beams of different proportions. The cost differential, as shown, is based entirely on differential quantities of material.

For any given combination of span and loading it is certainly possible to design a section for maximum economy of material. Economy of material was a principal factor in the selection of the AASHO-PCI beam dimensions, but by no means the only consideration. Establishment of a limited number of shapes for a maximum range of utility, combined with simplicity in placing of concrete and reinforcing, and the use of proportions of proven practicality together with structural adequacy, were all guides for design.

The AASHO-PCI beams, as recommended, are sturdy, rugged sections, simple to form and cast, capable of withstanding handling stresses and even some abuse incidental to transportation and erection. They are also proportioned to minimize some objectionable construction foibles that experience has shown are likely to be encountered in lighter sections. Within the utility of the four sections there is a reasonable answer in beam and slab construction for any problem of highway loading and any span between 30 and 100 ft. The quantity of material required will not, necessarily, be an absolute minimum for all conditions.

The writer does not question the computed structural adequacy of the lighter sections shown for CTC beams. Unfortunately, it seems that simple mechanical computation does not provide all of the answers needed for proportioning of these beams. The first designs of prestressed beams used in Florida bridge practice involved dimensions quite similar to those shown for the CTC beams. Some important structures were built with these beams, but so many objectionable characteristics developed that modifications of form were finally required and made at considerable expense in the plants of two large producers.

To be specific, Florida experience would lead us to expect the lighter beams to be plagued with cracking at the junction of the top flange and web and large objectionable bubbles of entrapped air on the upper surface of the bottom flange. Both of these conditions appear to result from the large and abrupt reentrant angle at the junction of flange and web. These conditions may not be experienced with every beam, but the incidence will most likely be high. The AASHO-PCI beams use a 45 deg fillet between web and flange, though an even better shape would be a large curved fillet.

The webs of the lighter beams are thin and high. Cover over the two systems of reinforcing—the tendons and web stirrups—will be very thin for the severe exposures in bridges. Placement of concrete through the high thin web is difficult, even with the maximum slump allowed and the best of vibration. Cracking of webs under the stresses and lateral vibrations incidental to handling is likely.

In the computation of costs, unit prices are assumed that appear reasonable for the AASHO-PCI section. They would not apply to the more difficult concrete placement and smaller volumes of the lighter section. It is also noted that the AASHO-PCI Type III beam is compared with a section providing only 71% of its moment of inertia and even less of section modulus with respect to the bottom flange. It is also noted that the CTC beams are listed in 17 shapes and the AASHO-PCI beams are in only four. With the cost of steel forms varying from about $35 to $70 per lin ft of beam, a much larger capital investment is required for a plant producing the full range of light beams.

It appears to the writer that the cost comparisons, as listed, are unrealistic. Sturdy, simple beams are being compared with relatively fragile sections of difficult construction. Regardless of cost, our experience involving many thousands of precast-prestressed beams in Florida bridge practice would make the lighter sections unacceptable to us at any price.

W. E. DEAN
Chairman
Joint AASHO-PCI Subcommittee on Prestressed Beams

•

SIR — Mr. Anderson's article, "How Beam Designs Affect Prestressed Concrete Bridge Design" (ENR Oct. 17, p. 326) must be praised for its effort to bring about reduced costs in prestressed concrete bridge girders, but certain flaws in his assumptions should be considered.

The proposed design of both the lightweight T sections and I sections are as yet unaccepted by most authorities. Before economic comparisons are made between Mr. Anderson's designs and sections of general acceptance, the lightweight beams should be proven structurally sound by both calculations and controlled testing. One should be especially dubious of the use of the thin web section and sharp reentrant angle of the flange into the web. Design practices such as these have been tried and found unsuccessful.

The grout-filled key connecting adjacent T beams is of doubtful value for load transfer. It is becoming more common to project dowels from the flanges of the T's, leaving a gap to be filled with concrete after erection. The use of lightweight concrete in Mr. Anderson's designs is, without doubt, economical, but where lightweight concrete is acceptable it can be used for any section with the same beneficial results.

The cost analysis presented was purely theoretical. Mr. Anderson chose a set of unit prices, made a gross assumption, and proceeded to grind out the obvious results. The assumption was that the unit prices for casting and erecting the T section would be the same as those for the less complicated box section. In other words, he claimed that the cost of a beam is directly proportional to the quantity of material used. Some of the other factors affecting the relative price are:

1. Casting and erecting diaphragms, which are eliminated with a box section, are not reflected in the cost of the T section.
2. Box-section strands are generally straight while a substantial number of T section strands must be draped for many of the depth-to-span ratios given.
3. The deep section of the lightweight T, for relatively short spans, may be uneconomical because of the additional fill required to maintain clearance under the structure.
4. The lightweight T section is relatively difficult to handle, store, transport and erect due to its instability, high center of gravity, low torsional resistance, and fragile shape.
5. The T section normally requires

(*Continued on page 13*)

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Superintendent H. G. Thompson rates his Euclid "Twin" this way, "This Twin-Power Scraper has so much more power, it can operate over areas where other units need the help of push tractors to negotiate the quagmire conditions on this job." Outstanding work-ability of the "Twin" is proved by production records which show the "Euc" averages about 10 extra payloads per shift over other scrapers in this tough going.

The material is an unstable combination of saturated clay, silt and sand. The "Euc" loads in a 40′ deep pit, climbs the 11% grade and makes the 1½ mile haul to fill area over 40 times a day. Operator Carlton Sauls reports, "I can get out of the pit without any help while the other scrapers need a push every time."

"TWINS" ARE BIG PRODUCERS

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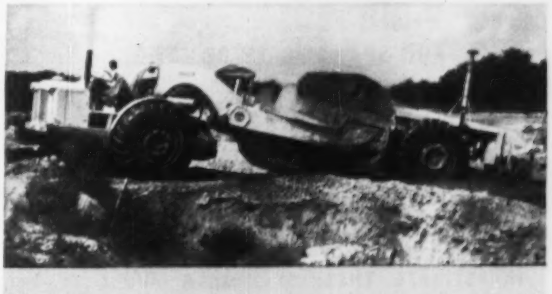
Have your Euclid dealer show you performance data on the "Twin" and provide a production-cost estimate for your work. You'll see why ***Euclids are your best investment.***

EUCLID DIVISION GENERAL MOTORS CORPORATION, Cleveland 17, Ohio



The greater all-around work-ability of "Twins" in any kind of scraper material, on long hauls or short hauls, on big projects or small jobs, enables them to work earlier as well as later in the season.

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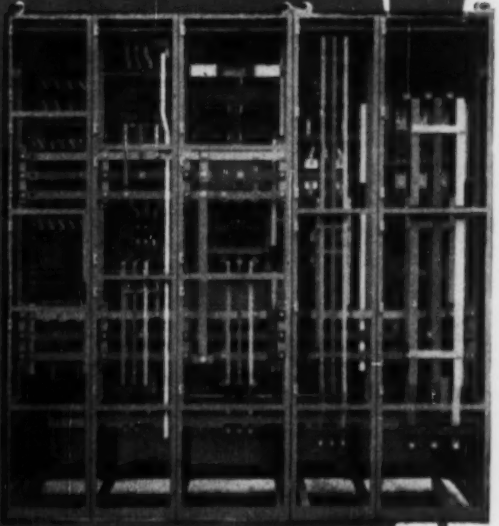
sums up the switching state of a modern AEG power distribution board. Its tiered low-voltage panels display instruments and controls which are easy on the eye, and as ready to hand.

The cubicles are fully assembled at the works. Their contemporary design is distinguished by compartmented switchgear units which are easy to withdraw for service and exchange.

Such standard units can be combined like building bricks, a facility which makes for easy planning and ready extension of industrial distribution centres.



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Berlin (West) EXPORT DEPARTMENT Frankfurt (Main)

In carrier landings, planes coming in at more than 100 knots are stopped in a split second. This amazing performance is made possible by having each plane hook onto one of several wire ropes stretched across the flight deck. Both plane and rope receive an almost unbelievable shock at the moment of contact. Needless to say, only top-quality wire ropes can be used for this application because . .

you can't bargain with safety

While your use of wire rope differs from this carrier application, *safety should be just as important to you.* For, although a "bargain" rope may save you money, it can cost you your peace of mind. So don't bargain with safety. Buy a rope that's a *quality* rope—buy Wickwire Rope.

5049

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PRODUCT OF WICKWIRE SPENCER STEEL DIVISION
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WICKWIRE SPENCER STEEL DIVISION—Boston • Buffalo • Chattanooga • Chicago • Detroit • Emlenton (Pa.) • New Orleans
New York • Philadelphia

anchor bolts and elaborate bearings, because of the small bearing areas and resulting high unit loads.

From the standpoint of experience (noth theory), it has been found that the box beam has been able to compete successfully with the T and I sections designed to meet a given set of standards, such as the Bureau of Public Roads criteria. The pricing of beams in the last analysis is done by the contractor erecting the structure, not the engineer. Contractors, given the opportunity to choose the type of beam they would erect, have consistently decided on box sections. However, it cannot be said that any one section is always the most economical. Each structure has a unique set of conditions that must be carefully analyzed together with the advantages and disadvantages of the various sections.

In conclusion, Mr. Anderson has presented what appears to be a biased price comparison, which reflects unfairly on the designers and manufacturers of sections meeting current design criteria, as well as being misleading to potential users of the lightweight sections.

Howard O. Gilbertson
Engineer, AMDEK Division
American-Marietta Co.
Chicago, Illinois

•

Sir—ENR Oct. 17, p. 326, contains an article by Arthur R. Anderson, comparing the economics of different prestressed concrete bridge members based on assumed costs. The conclusions thus drawn reflect unfavorably on the standard sections developed by the Bureau of Public Roads and by the joint committee of the American Association of Highway Officials and the Prestressed Concrete Institute.

The Prestressed Concrete Institute feels that the data presented and conclusions drawn are inaccurate and misleading.

Mr. Anderson bases all his economic comparisons on assumed unit costs. These assumed unit costs are, in our opinion, not correct for some of the sections; e.g., Mr. Anderson's assumptions for the Bureau of Public Roads standard slab sections are about 40% higher than current selling prices in many parts of the country. Further, the flat-slab design has many economic advantages beyond the cost per square foot of the member, particularly the very low depth-to-span ratio.

With regard to the comparison between the AASHO-PCI girder and the Concrete Technology Corp. girder, Mr. Anderson uses the same price per cubic yard for concrete for both. This is obviously erroneous, since making the web

"there's no comparison . . ."

"Our model HH 'PAYLOADER' handles an average of 100 tons per hour working a 50 foot radius loading the bins at our asphalt plant," says C. A. Pratt, plant manager of Osborne, Inc., Mentor, Ohio, who also use it on highway construction. *"It has our larger, heavier loader beat in all these features — ease of operation, operator safety and work-ability. There's no comparison."*

G. C. Balish, the operator, says "it's built for maximum production. The roll-back bucket action is the best of any loader I've ever operated — gets a full payload every time and keeps a full load during delivery . . has maximum operator safety and operating ease. I prefer the HH any day."

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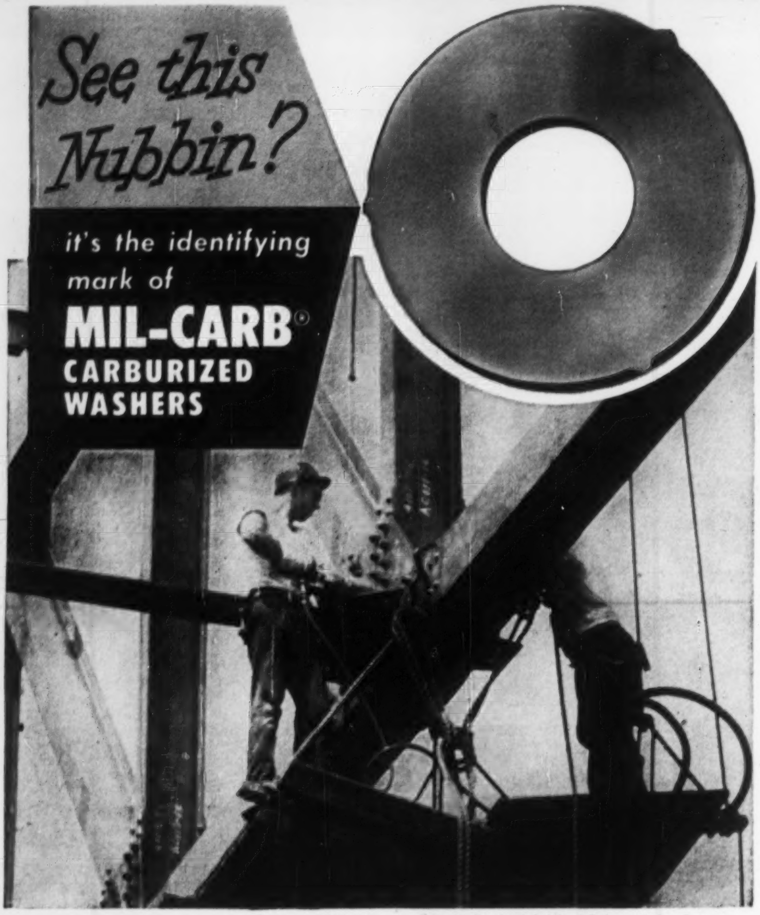

Photo courtesy Russell, Burdsall & Ward Bolt and Nut Co.

From an appearance standpoint, all washers, regardless of brands, practically look alike. But, *there's a big difference in quality!* That's why, for easy identification and to insure your getting the very best, Mil-Carb Carburized Washers are identified by 3 "nubbins" on the outside rim.

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thinner saves concrete but does not save any formwork, handling or plant costs.

The AASHO-PCI standard girders were selected after careful consideration by engineers with wide experience in design, manufacture and use. The flat slopes on the top side of the bottom flange and underside of the top flange were specifically considered and rejected, because of poor experiences with such a section, including cracking and checking, and difficulties in concrete placement. The web thickness for the AASHO-PCI girders was selected to permit good concrete placement, and the installation, with proper concrete cover, of any of the many recognized systems of post-tensioning and pretensioning now in accepted use.

Consideration was also given to handling, erection and bracing, and sections similar to that proposed by Mr. Anderson were considered and rejected on these accounts, in favor of the more rugged sections finally adopted by AASHO-PCI.

While Mr. Anderson has been a leading figure in the design and development of the prestressed concrete industry, we must take strong exception to the statements and conclusions in this article.

BEN C. GERWICK, JR.
President
Prestressed Concrete Institute

•

. . . Reply to Mr. Dean

SIR—Mr. Dean is a highly-respected bridge engineer, and I appreciate his comments on my article. I am pleased to note that he does not question the computed structural adequacy of the lighter sections.

Mr. Dean's Florida experience with cracking at the junction of the top flange and web and objectionable bubbles of entrapped air on the upper surface of the bottom flange is regrettable. He mentions the difficulty of producing the thin webs and lack of cover over the stirrups. These objections have been overcome in Tacoma by improved production techniques.

Concrete Technology Corp. casts a zero-slump concrete in steel forms and employs very powerful internal and external vibration to place and compact the concrete. We do not steam-cure. However, with normal temperature curing we get a dense concrete having a one-day strength of 5,000 psi, and a 28 day strength of 8,000 to 9,000 psi. The process is well-mechanized, and the production cost per cubic yard is in line with costs for the heavier members produced by conventional methods. Of course, the elimination of steam curing and the reduction of excess dead load also saves money.

The lighter sections have the same ratio of transverse moment of inertia to weight as the heavier sections, and our experience in handling the lighter sections—some over 100 ft. long has been excellent.

Concrete Technology Corp. feels that it is up to the industry to develop efficient prestressed concrete beam sections and offer them to the design engineer, much the same as has been done by the steel industry. Obviously, a designer is pleased to have a broad selection of wide-flange steel structural shapes. He should also appreciate a comparable choice in prestressed concrete, once he has been convinced that the industry is capable of delivering them with a guaranteed performance.

High-quality prestressed concrete having sections illustrated in the article have been produced economically in Tacoma, and if engineers see fit to specify it in other areas of the country, progressive fabricators in those areas will seek the opportunity to produce it.

. . . Reply to Mr. Gilbertson

Mr. Gilbertson objects to my method of arriving at costs, yet he does not suggest a better method for a designer to make comparative cost studies.

The cost-analysis method is intended to help engineers develop cost comparisons in preliminary design. The unit prices given are based on actual experience in the production of prestressed beams in Tacoma. As stated in the article, these unit prices can be adjusted to fit labor and material costs for a given locality.

In practice, it is not uncommon to bid concrete structures by unit prices for the materials, and the cost data presented in my article follow this procedure.

Mr. Gilbertson conjectures that lightweight T and I sections have not been proved practical. On the contrary, not only have they been proved by tests, but also they have been successfully fabricated, transported and erected on many projects in the Pacific Northwest.

In fact, many of the T-beam bridges fabricated by Concrete Technology Corp. are in service on private logging roads, where the live loading is H-50, S-40 (2½ times the AASHO H-20, S-16 loading). After several years of service, the grout-filled keys have been found completely satisfactory for load transfer.

When considering the design of a concrete structure, why should we not look to the masters in this field: Robert Maillart, Eugene Freyssinet and Pier Lugi Nervi? Truly, these great engineers have not achieved fame by creating heavy or bulky sections.

The techniques are now well established for the efficient and economical production of prestressed concrete structures from the sections described in my article. The results obtained have clearly demonstrated the economic advantages of high-performance, factory-produced prestressed concrete.

. . . Reply to Mr. Gerwick

Mr. Gerwick also finds fault with my method of comparative cost analysis by pointing out that the thin web saves concrete, but does not save handling or plant costs.

However, he must recognize that the total difference in cost also includes a substantial difference in the amount of prestressing steel required.

Not included in the cost comparison but mentioned in the article is the matter of transportation and erection cost. Mr. Gerwick has assumed that the light, high performance sections would be difficult to transport and erect.

Our experience has been exactly opposite. We have found that they can be transported and erected with ease, and that the saving in dead load makes the contractor's job easier, and the hauling costs, which are based directly on weight, are substantially lowered.

I wish to thank those who have discussed my article, and hope that designers and producers of prestressed concrete will encourage further advances in the technology of prestressed concrete.

ARTHUR A. ANDERSON
Concrete Technology Corp.
Tacoma, Wash.

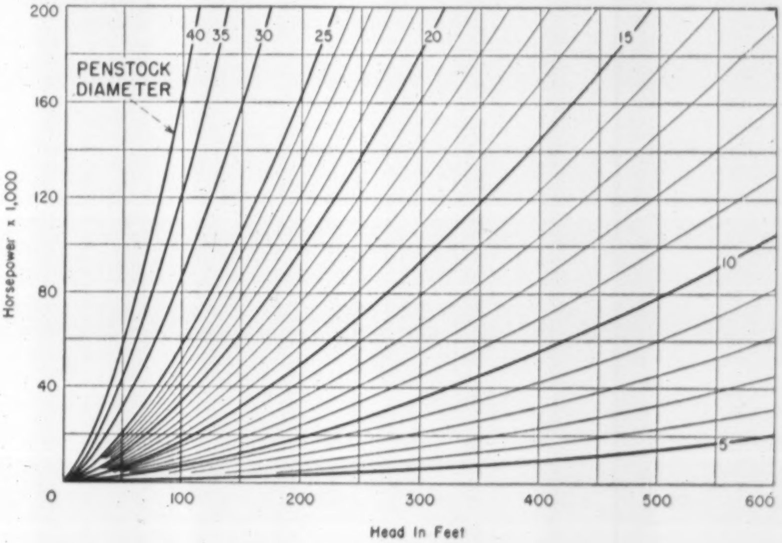
Fair Structures Fire Risks?

SIR—The Brussels World's Fair of 1958 (ENR Sept. 26, 1957, p. 36) is apparently no exception to most of those which have preceded it. The structural engineers have almost uniformly ignored considerations of fire protection engineering.

Many of the structural assemblies described will house combustible contents, and a fire protection engineer would envisage early failure of load-carrying members under fire exposure, and much unnecessary destruction both to the buildings and their contents. You commented editorially (ENR May 2, 1957) that fire resistance should get engineering attention as well as gravity loading.

The least that structural engineers

(*Continued on page 16*)



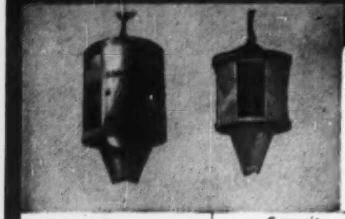
Penstocks Sized Even Quicker

SIR—In ENR Aug. 15, p. 78, you published an article by G. S. Sarkaria, titled "Penstocks Sized Quickly."

Using Mr. Sarkaria's equation ($D = 4.44\ (P^{0.43}/H^{0.65})$), the writer calculated values of head (H) for increments of 5,000 hp penstock diameters from 5 to 40 ft. The accompanying graph is based on these computations and would relieve the designer of the necessity of tedious calculations involving fractional powers.

G. E. MACISAAC
Design Engineer
Hydro-Electric Commission of Ontario
Toronto, Canada

AN EASY GUIDE TO
concrete handling equipment
CAPACITIES



CONCRETE BUCKETS

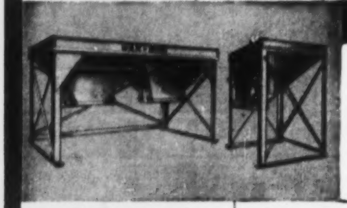
Choose your buckets from Gar-Bro's 33 different types and sizes ranging from 1/3 to 8 cu. yds. They handle all concrete mixes and aggregate sizes—are available in round or laydown types. Each is equipped with Gar-Bro patented self-closing, grout tight, double clamshell gates. Consult the chart below for sizes and types.

Type	Capacity (cu. yds.)	Concrete Slump	Aggregate Size (Max.)	No. of Bucket Sizes
LIGHTWEIGHT	1/3 to 1 1/2	Normal	3"	5
STANDARD DUTY	3/4 to 4	Low Slump	3"	6
HEAVY DUTY	2 to 8	Dry	6"	6
LAYDOWN	1/2 to 3	Normal or dry	3" or 6"	16

CONCRETE CARTS POWER, HAND

See and compare Gar-Bro Power Carts. They were designed for concrete handling. Nothing can match the power-cart for speed, power, capacity and maneuverability for handling concrete. Concrete hand carts are balanced for easier pushing and dumping, get more loads per day because they are matched to man's muscle. Check the chart below for the type that suits your job.

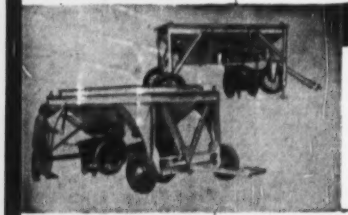
Equipment	Load Capacity	Maximum Travel Distance	Speed	Capacity* per Hour
POWER CARTS	12 cu. ft.	1000 ft.	15 mpr.	15 to 20 cu. yds.
CONCRETE CARTS	6 to 8 cu. ft.	200 ft.	walking	3 to 5 cu. yds.
			*according to hauling distance	



CONCRETE HOPPERS

Make your selection from 16 models of Gar-Bro Hoppers. They serve as intermediate storage for concrete. Increase your concrete placing speed and prevent truck mixer delays. Use the chart for further details.

Type	No. of Gates	Cap. (cu. ft.)	Attachments
VERTICAL FRONT	Single	28 to 67	Collars & Stands
CENTER DISCHARGE	Single	32 to 72	Collars & Stands
VERTICAL FRONT	Double	54 to 135	Collars & Stands
CENTER DISCHARGE	Double	63 to 144	Collars & Stands



PORTABLE HOPPERS

These wheeled Gar-Bro Portable Hoppers provide a mobile concrete supply station for cart crews. Are built for easy charging by truck mixers and speeds discharging for cart loading. Refer to the chart for the type and size that fits your requirements the best.

Type	No. of Gates	Cap. (cu. yds.)	Type of Gate
PORTABLE	2	2 to 3	Double Clamshell
SEMI-PORTABLE	2	3 to 4	Double Clamshell

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should recommend for fire protection would be automatic sprinklers to prevent the failure in a fire of structures in which unprotected steel tension members are frequently employed. I have been sometimes told by structural designers that they expect a good public fire department to prevent such structural failure. On the basis of past experience, this is not realistic engineering.

The Brussels' buildings are reminiscent of the "Crystal Palace" which featured the New York World's Fair of 1853. This burned in 1858, an occasion made famous by the issuance of a Currier and Ives print.

At the World's Fair of 1851, the British also had a "Crystal Palace" which was built originally in Hyde Park, London, and moved to Sydenham Hill in Southeast London in 1854. This building lasted a bit longer than the American Crystal Palace. It took four fires to complete its inevitable destruction. In 1866, the north wing was destroyed by a million-dollar fire. In 1923, there was a small fire in the south wing. In 1936, the main wing was destroyed. The last part of the building burned in 1950, just in time so that the building could be cleared away for the centennial anniversary of the 1851 fair, the 1951 Festival of Britain.

I am trying to enlist the support of engineers in the idea of following through and dealing comprehensively with the structures on which their engineering assistance is asked. It seems to me that it will continue to be a reflection on the competence of engineers if they solve certain parts of the engineering problem and ignore others. That is what they seem to have done in connection with the exposition structures at Brussels.

HORATIO BOND
Chief Engineer
National Fire Protection Association
Boston, Mass.

CALENDAR

Building Research Institute, adhesives and sealants conference, Shoreham Hotel, Washington, D. C., Dec. 4-5.

The Asphalt Institute, annual meeting, New York Athletic Club, New York, N. Y., Dec. 4-5.

Highway Research Board, annual meeting, Sheraton-Park Hotel, Washington, D. C., Jan. 6-10.

National Construction Industry Conference, 3rd annual conference, Congress Hotel, Chicago, Ill., Dec. 11-12.

National Association of Home Builders, annual meeting, Conrad Hilton Hotel, Chicago, Ill., Jan. 19-24.

American Road Builders Association, annual meeting, Sheraton-Park Hotel, Washington, D. C., Jan. 20-23.

Associated Equipment Distributors, annual meeting, Conrad Hilton Hotel, Chicago, Ill., Jan. 26-30.

87% Availability with "Euc" Rear-Dumps

Equipped with Torqmatic Drive, hydraulic power steering and 18.00 x 25 dual drive tires, the 22-ton "Eucs" are powered with 300 h. p. engines and have a top speed of 27 mph with full payload.

Five Euclids
haul 2500 tons of rock daily for Dragon Cement Co.

Steady production is maintained at Dragon Cement Company in Northampton, Pennsylvania with a haulage fleet of six 22-ton Rear-Dump Euclids. Simple, rugged construction and a thorough preventive maintenance program have enabled these reliable haulers to post an 87% availability record. Depending on production requirements, four or five of the "Eucs" work an average of 6 hours per day each, with either one or two held for standby service.

Assistant Plant Manager F. J. Anderson reports that the Euclids are loaded by two 2½ yd. shovels and haul an average of 2500 tons of cement rock daily to the dumping spot over a mile away. Loads are dumped into the 35-ton hopper in 30-45 seconds. Total time for the 2¼ mile trip from loading shovel to hopper and return averages 11 minutes.

The dependable performance of "Eucs"—job-proved on hundreds of mine, quarry and industrial operations—results in more work done at lower cost per ton. Your nearby Euclid dealer will be glad to provide you with facts and figures on the complete line of Euclid earthmoving equipment . . . and show you why ***Euclids are your best investment.***

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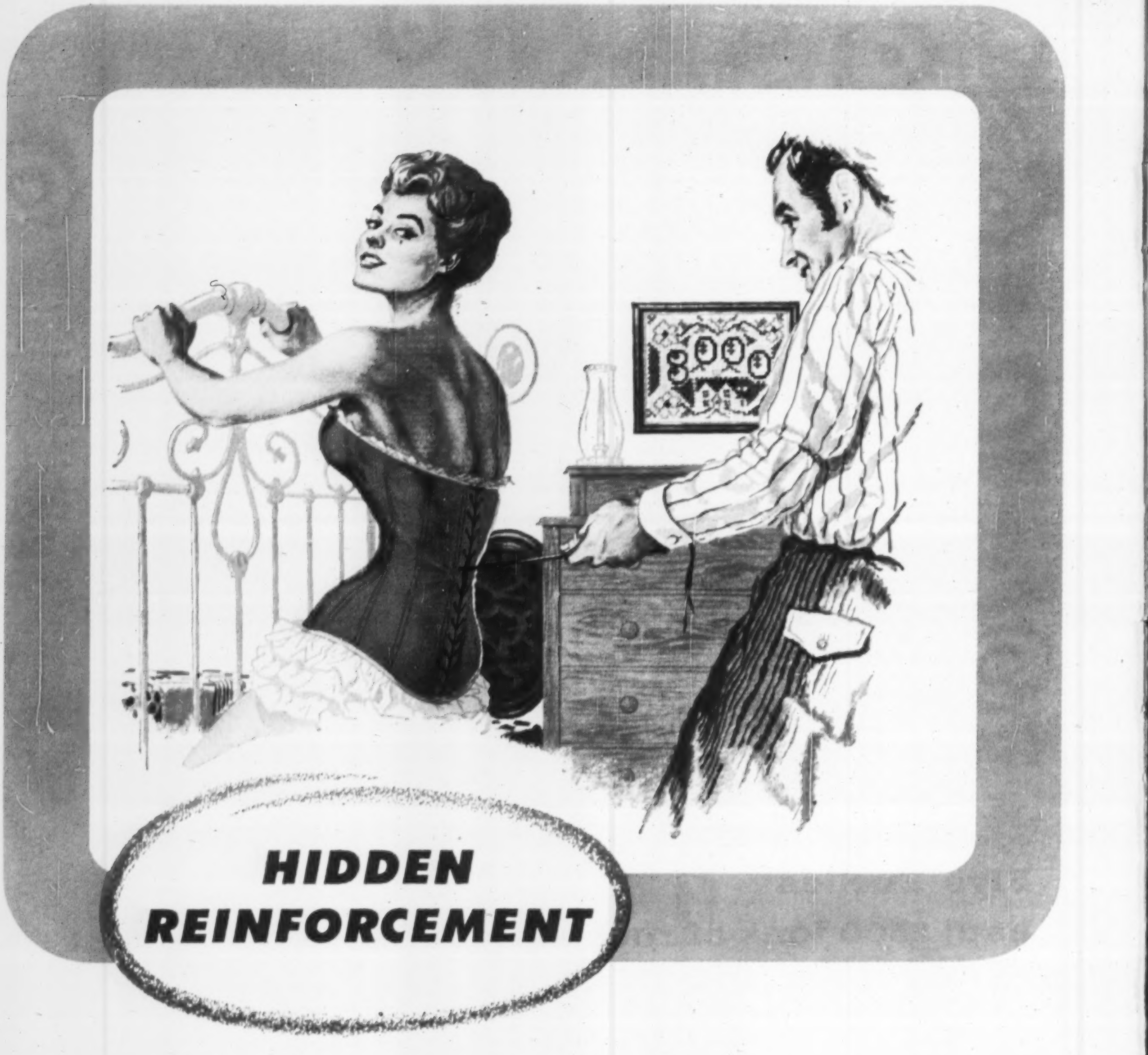

Great grandmother used hidden reinforcement to restrain her figure; Lock Joint prestressed pipe design uses much the same principle to restrain the high internal pressures in present day water transmission lines. Lock Joint's hidden reinforcement consists of high tensile wire wrapped under high uniform tension around the core of the pipe.

Can you guess how many miles of such wire were used in the 120,000-foot 66″ Lock Joint Prestressed Concrete Embedded Cylinder Pipeline for Wichita's water supply system? The answer will be found—not too carefully hidden—in the picture above.

Samples of all such high tensile wire used in the production of Lock Joint prestressed pipe not only are certified by mill tests, but also must meet the exacting standards demanded by rigorous tests to which they are subjected in Lock Joint's own laboratory. This is only one of the many quality control measures employed in every phase of the manufacture of Lock Joint Pressure Pipe to assure the customer the finest product obtainable.

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ENGINEERING NEWS-RECORD

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THE CONSTRUCTION WEEK

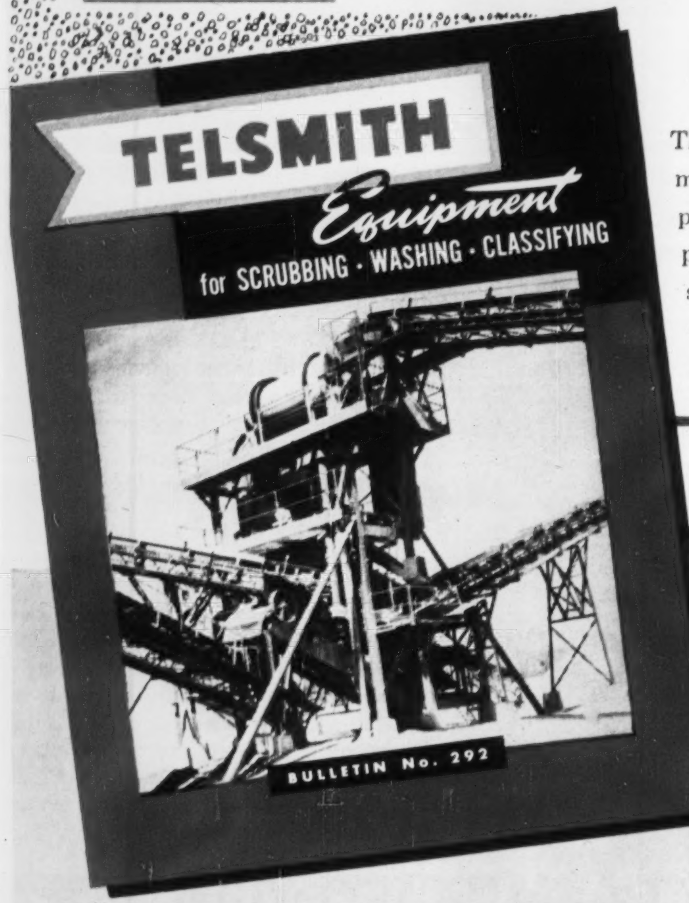
TAX WITHOUT BENEFIT—Hawaii officials used a November visit of the House Public Works Committee to protest the territory's "taxation without participation" under the Defense Highway Act. Hawaii will pay some $20 million in auto use tax in the next 12 years but receive no benefit. Islanders contended that the importance of Hawaii as a military base justifies inclusion of its roads in the defense system—and mentioned some 300 miles that would entitle it up to $300 million. Acting Gov. F. L. Turner said the territorial government will oppose a simple rebate of the tax, as suggested by committee members, but will seek equal participation with the 48 states.

NIAGARA STILL UNSETTLED—Boxscore on the Niagara Power Project this week stood as follows: License hearings before a Federal Power Commission examiner have concluded and the objecting local communities—two remaining of an original four—have until Jan. 2 to prepare a summary brief. Power Authority of the State of New York has appealed directly to FPC to throw out the intervenors' case because it is based on objections to the carefully engineered open power canals, whereas the municipalities are really interested in securing additional payments from PASNY in lieu of local taxes—an issue not before FPC. Meanwhile, PASNY will open twice-delayed bids on the $80-100 million Lewiston powerhouse on Dec. 12. And the authority is sitting on a number of earlier equipment bids which can be withdrawn shortly if not accepted by formal contract. The outlook: An FPC license in January and a later winter or early spring construction start.

BILL TO STOP SNAKE RIVER DAMBUILDING—Public power enthusiasts in the Pacific Northwest have called for a moratorium on dam construction and licensing in the middle stretch of the Snake River. Idea is to preserve the Nez Perce site until fish passage problems can be solved by stopping private utility plans to build Pleasant Valley and Mountain Sheep Dams just upstream and above the confluence of the Salmon River. Oregon's Sen. Wayne Morse said he will introduce a bill before Congress to suspend the Federal Power Commission's licensing authority on the middle Snake.

WRENCH IN THE PLUMBING—In the midst of the apparent general agreement between general and specialty contractors on H.R. 7168—the anti-bid-shopping bill—the plumbing contractors threw a big monkey wrench. Said W. S. Hokum, president of the National Association of Plumbing Contractors: "All mechanical contractors should oppose the bill, on ground that it isn't strong enough; and jeopardizes 10 existing state laws." Particular objection also was a provision in the bill that limits mechanical specialty work to a point five ft outside the building line.

HOW TO PRODUCE TOP-QUALITY AGGREGATES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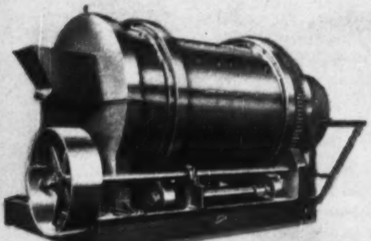
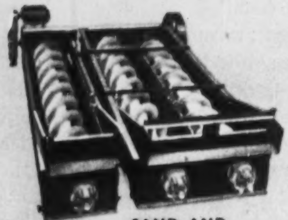
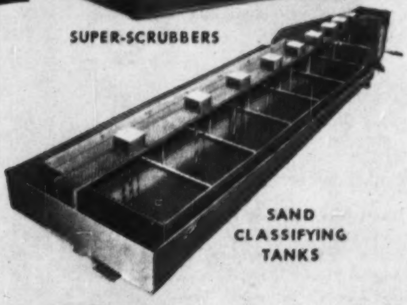

SUPER-SCRUBBERS


SAND AND GRAVEL REWASHERS

SAND DRAGS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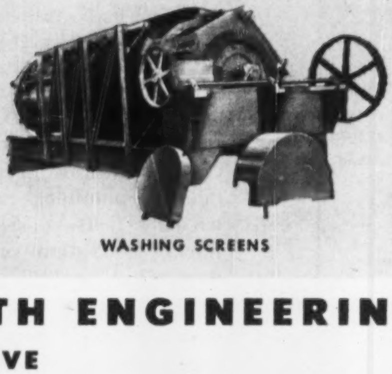
SAND TANKS


WASHING SCREENS

SCREW TYPE SAND CLASSIFIERS

E-17

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WASHINGTON OBSERVER

- Soviet report in public works fight
- New missile base construction in U.S.
- FPC has decision on Snake dams

● **Congressmen opposing cutbacks in public works to pay for missiles are gathering their ammunition for the fight next year.** They see their chances improving with the new illness of President Eisenhower, they see less White House enforcement of a hard policy line on this matter with Vice President Nixon and Sherman Adams, the Assistant to the President, moving in to take more of the decision-making load off the President.

A report on public works in the U.S.S.R.—Russian reclamation, flood control, hydro-power projects and the like—is being prepared for the Senate Interior Committee by one-time Reclamation Commissioner Mike Straus. It's to be ready for the committee in January—and is supposed to show that the Russians are catching up with the U. S. on such projects as well as in other techincal and engineering fields.

Other political blocs—including the National Rivers and Harbors Congress—are already in the fray. They say that these projects are just as important now as before Sputnik, and they're still needed to "keep America strong" in the face of the new Russian threat.

—

● **New programs for construction of missile bases in the U. S. are to begin next year.** Short range, they don't involve a lot of money; but long range, there's obviously hundreds of millions involved.

A system of bases for the new Bomarc anti-aircraft missile is one of them. This one reaches out about 300 miles, which compares to the 25 mile range of the Nike Ajax anti-aircraft missiles that can be fired from the more than 100 installations already built around major cities.

It's unlikely the Bomarc bases will be as extensive as originally planned. Reason: The weapon is useful only against manned aircraft, not missiles. Even so, there will be millions of dollars of construction involved.

First intercontinental ballistic missile base in Wyoming is strictly a prototype. Building additional bases will depend on how our ICBMs themselves come along. The decision to build the $65 million base is one of those calculated risks. It's built to handle a precise missile. If the missile has to be junked in favor of another, then much of the construction at the ICBM base will have to be junked, too.

—

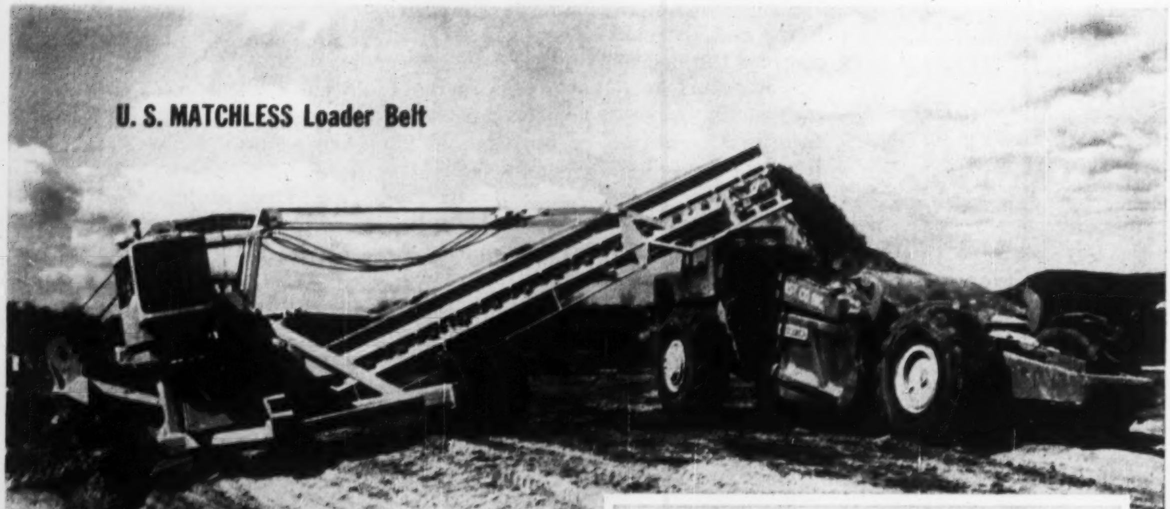
● **The Federal Power Commission has up for decision the two big Snake River dams, costing an estimated $234 million.** These are the Mountain Sheep and Pleasant Valley dams for which Pacific Northwest Power Co. is asking a license. They would be downstream from the present Hells Canyon dams the Idaho Power Co. is building.

Opposition wants the FPC to delay in order to give another big high dam at Nez Perce a chance for favorable consideration. The pro-high dam Hells Canyon association says "the fish problem"—how to get economically and politically important spawning salmon around the Nez Perce Dam—can be solved in a couple of years or so.

Pacific Northwest Power wants a fast decision out of FPC. It points out that construction costs keep going up. Its estimates on the two dams are already $20 million higher than they were only a short time ago.

US RUBBER CONVEYOR BELTS

HOW TO CARRY THE LOAD AND MAKE THE GRADE



U. S. MATCHLESS Loader Belt

U. S. MATCHLESS Elevating Grader Belt

Here are the belts that are built for battering—the U. S. Matchless Loader Belt and the U. S. Matchless Elevating Grader Belt. Each is engineered to handle the toughest kind of sharp, hard, excavated material.

These U. S. Matchless® belts have super frictions and skims combined with balanced fabric to assure maximum flex life over small pulleys. And, a special white cushion breaker ply of nylon—combined with standard nylon breakers in tough, resilient top and bottom covers—provide the maximum in shock absorption, as well as outstanding resistance to tearing and gouging.

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DECEMBER 5, 1957

ENGINEERING
NEWS-RECORD

ENR Asked Engineers, Architects—

Compared with 1956 . . . →

- **What is your present design volume?**
- **What amount do you have scheduled for next year?**
- **What volume of design work is coming into your office?**
- **What design staff changes have you planned?**

Conclusion:

First Half of '58 Could Boost the Boom

Contractors probably will be more active during next year's first six months than they were during the same period this year. This outlook is based on the results of a nationwide survey conducted by ENR. It revealed that engineers and architects currently have more work set to go into construction in 1958 than they had scheduled for 1957 at this time last year.

A total of 231 firms reported that they have on their boards, scheduled for construction in 1958, projects estimated to cost more than $2.5 billion. This is 22% more volume than they had scheduled for contract in 1957.

Of this total, $1.6 billion represents building projects while $942 million is heavy construction other than building. The building projects, up 13%, show a much smaller increase compared with the situation a year ago than other work which has jumped 43% over the same period last year.

However, these increases cannot be translated into total contracts in sight for 1958 for two major reasons:

- The returns are a small sample of the 5,600 firms in the country who, during 1956, each took on the design of jobs costing $100,000 or more. Questionnaires were sent to approximately 1,850 of these concerns.
- Other work will come into their offices later which also will go to construction contract next year, and there is no way for the reporting firms to measure this future inflow.

• **Good first half indicated**—The figures do suggest that the first half of 1958 should be better than the same period this year in terms of total contract awards. This is backed up by better than 50% of the reporting firms.

The extent of next year's first half gain in work ready to go to contract, however, may be offset to some extent by the slower rate at which designed projects are moving into construction contract. This slowdown appears to stem from financing difficulties or caution resulting from the leveling off in the economy's growth this year.

• **And the second half?**—While the first six months hold good promise, the same cannot be said for next year's final half. This period apparently will not be quite as rosy because, as 50% of the responding companies noted, new work is not coming in at as fast a pace as it has been in recent months. In addition, total design work in most offices

Labor Leader Asks Wage Freeze

A tense and perhaps historic 50th Anniversary Convention of the AFL-CIO Building and Construction Trades Department opened in Atlantic City, N. J. on Monday with three proposals of deep significance to the construction industry.

1. A voluntary moratorium on wage increases for construction workers during 1958.

2. Opposition by the building trades to expulsion of the teamsters union from the AFL-CIO.

3. A firm refusal to surrender any of the building trades work jurisdiction to industrial unions.

The proposals were made by department president Richard J. Gray, who said the views he expressed were his "own."

The wage freeze is part of a two-phase proposal designed to afford the construction industry a chance to make a constructive contribution to the fight aganist inflation. In addition to the wage boost moratorium which was recommended to the general presidents of the nineteen international building trades unions for adoption as a policy guide to their locals, Mr. Gray suggested appointment of a 13 man industry-wide committee to reduce construction cost and to increase construction volume.

In urging recision of the AFL-CIO suspension order against the teamsters union, he bitterly condemned "trials" by Congress and newspapers instead of by courts and juries and said the AFL-CIO has so far acted on unproven "charges." "I am not attempting to defend Dave Beck or Jimmy Hoffa or any other individual accused of wrong doing," he said, "but how can one justify the blacklisting of a great labor organization like the teamsters for what may or may not be the sins of a few of its top leadership." The controversial expulsion question will come before the big AFL-CIO convention which is scheduled to convene later this week.

On the jurisdictional question, which is the crucial factor in labor unity, President Gray said the problem can be solved if industrial unions will concede the building trades' right to do all construction, alteration and repair work. The construction unions claim that industrial unions are usurping their work to the detriment of both contractors and construction unions (ENR Nov. 28, p. 87).

is also below a year ago. Tied together, it would appear that contracts for the second half will be less than contract volume in the first half.

• Most sectors show strength—With only one exception—housing—the value of projects now on hand for next year are equal to or higher than the volume going to contract in 1957. Many groups show large increases:

- Office buildings, 52%.
- Public buildings other than housing, 32%.
- Waterworks and sewerage, 39%.
- Highways and bridges, 33%.
- Hydro and steampower projects, 107%.
- Shopping centers, 12%.

The firms reporting show increases of 3% for industrial building and schools. The industrial rise, although slight, is especially surprising because the volume of proposed industrial plants has sagged so severely this year that a continued down trend would seem inevitable.

The rise in school construction also offers a surprise, but for an opposite reason. School awards during the last two to three years have shown only a gradual rise, just barely keeping up with the population increases and its accompanying housing boom. However, it is possible that the drop in housing starts since 1956 and the increasing resistance to tax increases indicated by the stiffer attitude toward new bond issues at the November general elections (ENR Nov. 14, p. 29), will cut the pace of school building.

• Alert to trends—Although it is difficult to assess the overall percentage changes in 1958 contracts from the sample drawn, the contract amounts and the relative values of the percentage changes are useful for alerting the

1958 Construction Outlook

What work on the drawing boards indicates, as reported to ENR by 291 Architects and Consulting Engineers

Six out of ten firms have the same amount or more work in their offices today than they had a year ago . . .

		Home address is in this region of the U. S.						
	These firms have . . .	United States	New England	Mid-Atlantic	South	Midwest	West of Miss.	Far West
Total projects now on the drawing boards as compared to this time a year ago	. . . more work	111	8	31	10	34	15	13
	. . . less work	109	11	26	11	23	25	13
	. . . same amount	70	1	25	6	17	15	6
	. . . no answer	1	—	—	—	—	—	1
	Total reporting	**291**	**20**	**82**	**27**	**74**	**55**	**33**

. . . and nearly half of these firms have more work scheduled for construction in the year ahead than they had a year ago . . .

	These firms have . . .	United States	New England	Mid-Atlantic	South	Midwest	West of Miss.	Far West
How the value of jobs being designed to go to construction in '58 compares with projects on hand a year ago to start construction in '57	. . . more work	138	11	36	15	32	27	17
	. . . less work	85	4	24	9	23	18	7
	. . . same amount	8	0	5	0	2	1	0
	. . . no answer	60	5	17	3	17	9	9
	Total reporting	**291**	**20**	**82**	**27**	**74**	**55**	**33**

. . . but many firms note a slowdown in the rate designed jobs are going to construction . . .

This number of firms say: compared to a year ago, jobs are going to construction . . .			
. . . faster	. . . slower	. . . same rate	
19	104	161	United States*
2	12	5	New England
7	26	49	Middle Atlantic
2	15	10	South
7	27	38	Middle West
1	19	33	West of Miss. R.
0	5	26	Far West

. . . and new design work isn't coming in as fast now as it was at this time a year ago

	This number of firms say: compared to a year ago, new design work is coming in . . .		
	. . . faster	. . . slower	. . . same rate
United States*	60	145	81
New England	4	13	3
Middle Atlantic	20	37	25
South	5	16	6
Middle West	17	39	18
West of Miss. R.	5	27	21
Far West	9	13	8

**Number of firms shown does not add up to total count of 291 reporting in survey because a few firms did not answer the question.*

Growth in '57 and prospective growth in the next six months of architects' and Engineers' design staffs

Nearly as many firms will enlarge their staffs in '58 as those who increased in '57

		Growth in 1957: This number of firms . . .				Plans for the next six months: This number of firms plan to . . .			
Home address	Total number of firms reporting	. . . increased staffs	. . . reduced staffs	. . . maintained same size of staff	(no ans)	. . . enlarge staffs	. . . reduce staffs	. . . hold staffs at present number	(no ans)
U. S. Total	291	93	70	124	4	87	24	175	5
New England	20	4	3	13	0	7	1	12	0
Middle Atlantic	82	27	20	33	2	27	13	41	1
South	27	6	11	10	0	9	3	15	0
Middle West	74	31	16	27	0	22	5	47	0
West of the Mississippi	55	14	9	31	1	9	1	42	3
Far West	33	11	11	10	1	13	1	18	1

construction industry to possible shifts in contract trends during the next six months or so.

As with many figures developed from sampling surveys, careful consideration must be given before deciding on their meaning.

For example, ENR took its first such survey in 1953, to check on how business would go in 1954. That first survey pointed to an increase of 27% for 1954, and was rejected by the magazine's statisticians. The actual result of that year was a downturn of 3%. Because of this, when ENR's second survey (made in 1954 to forecast 1955 business) came in indicating a 24% increase, the editors decided to weigh the result heavily on the conservative side, and predicted a cautious 8.5% rise. The actual rise for 1955 came out to 30%—closely confirming the survey.

• **Economy and construction related**— The construction industry obviously cannot stand aside from the general economic outlook. The colors in the general picture will run into those for construction.

Just as the business downturn in 1954 may have upset the schedules for construction on the drawing boards late in 1953, so may the 1957 economic situation affect 1958 construction.

ENR already has predicted that contract awards next year will match those of this year. This still appears to be a reasonable forecast—particularly since it includes a 20% drop in federal work, the outlook for which is poorly measured by the private drawing boards included in this survey.

However, the survey does make it apparent that the drop in contracts during 1957 has bottomed out.

Detroit Water Fight

Wayne County lets contracts over protests by city

Wayne County, Mich., has overridden strenuous objections by the City of Detroit and awarded contracts for a 450 mgd water intake in the lower Detroit River. The awards, first of an ultimate $50 million worth for a complete county water system, were made soon after the State Supreme Court denied an injunction sought by the city (which is part of Wayne County).

Detroit, which had once favored a separate county water system, fought it during the last 18 months. The city realized that the additional treated water capacity from its current waterworks expansion program would not be fully utilized for a good number of years if Wayne County had a separate system. And over a long-term period, the city believed a single system would be more economical for both city and county. (Right now, Detroit serves a portion of Wayne County; the new county system would serve the rest of the county where great growth is expected.)

Wayne County officials are dubious about Detroit's ability to deliver water to the county in the quantities and at the time required. They also believe that their separate plan will be the most economical for the county after a 15-20 year period. The intake and treatment plant in the county plan are much closer to the areas of water demand than are the city's Detroit River intake and treatment facilities.

With last month's contract lettings, the county viewpoint has prevailed.

Thus, the water situation in the Detroit area is running counter to the nationwide trend of cities furnishing more and more water to the suburbs. On the other hand, it is meeting another high level objective—provision of two separate major water intakes for the area (all of Detroit's water is drawn through one intake).

Contracts have been awarded to A. F. Wikstron Corp., Skaneateles, N. Y., for the intake—a tower—and a small tunnel section for $2.8 million, and to James McHugh Co., Chicago, which bid $2.4 million for 5,000 ft tunnel section under the river.

Signing of a third contract for a $5.9 million landward tunnel was delayed due to the illness of one of the partners of Garavaglia, Fattore & Santucci, Detroit. The county system was designed by Hazen & Sawyer, New York; Giffels & Vallet, Detroit; and Parsons, Brinkerhoff, Hall and Macdonald.

A Missiles Program on A-Bomb Pattern?

Only if fundamental changes are made in Department of Defense, says Gen. Groves, ex-Manhattan District head

Lt. Gen. Leslie R. Groves (U.S.A. Ret.), the Army Engineer who headed the wartime Manhattan District that developed the atomic bomb, is certain that some of the same tough, red-tape cutting procedures used then (in 1943) must be applied again if we are to pass the Russians in the ballistic missiles field. General Groves, now vice president of Remington-Rand, Inc., cited these procedures in a talk last week before the New York Chapter of the Society of American Military Engineers.

Just as was done when the Manhattan District was created, let the Secretary of Defense issue a simple directive giving one man both the authority and the responsibility to produce the best missile, says General Groves. This man should then take over the supervision of every missile project under way without disrupting its operations in any particular. Then make changes as they appear necessary. In this way a confusing upheaval of many worthwhile projects can be avoided.

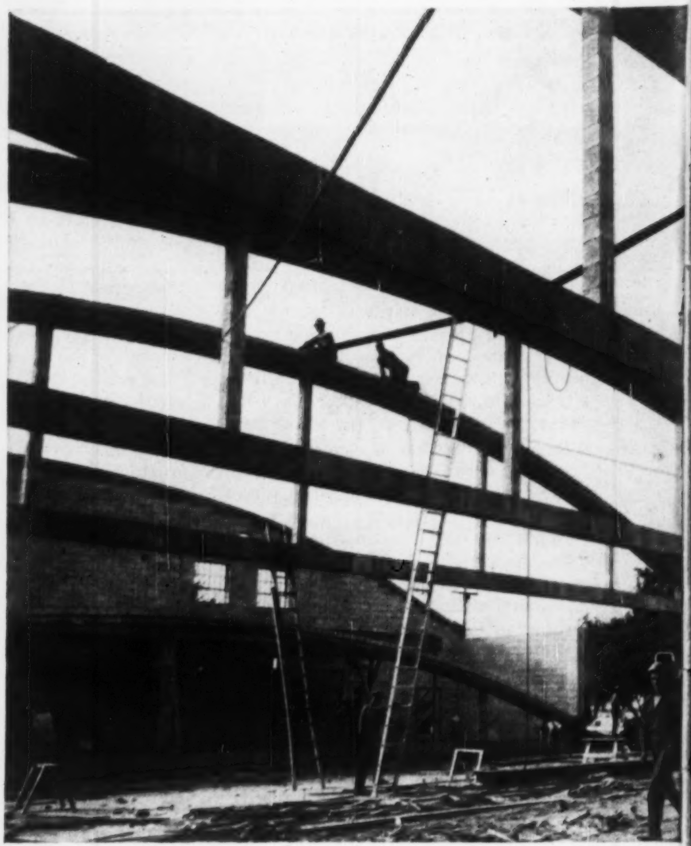
It was fundamental with the Manhattan District to use the best assets of the private enterprise American economy. The biggest and most experienced U.S. companies were called in to help. Proved management capacity and high labor skills were what was sought, and these were more certain this way than to experiment with new or smaller companies, no matter how potentially promising.

Another fundamental was to use existing federal departments and agencies for housekeeping and other chores, and thus avoid building up a big new bureaucratic organization.

The Manhattan District organization was tightly compartmentalized, each division or section being given a specific job to do. There was practically no liaison between compartments, on the theory that there is no reason to know what is going on elsewhere than in your own sphere of responsibility. Otherwise too much time is lost on matters of no immediate concern. In this same connection, General Groves takes a dim view of written reports. In his view, about the only person served by a written report is the one who writes it, who thus is forced to review his own work.

Finally, assuming that a tough, knowledgeable administrator is found and named missiles czar, he must be given both the authority and the responsibility to carry out the job. This is the real need, in General Groves' opinion, and coupled with it is the removal of all of the presently numerous assistant secretaries of defense from any authority over this now-independent top missiles man.

A major defect in the present defense setup, according to General Groves, is that these secretaries have authority but not direct responsibility for accomplishment. They could thus make life intolerable and effectiveness impossible for a missiles czar who did have this responsibility. When General Groves headed the Manhattan District's successful atom bomb project he had only two bosses, the Secretary of War and the President, and one top scientific advisor, Vannevar Bush, director, Office of Scientific Research and Development.



Made up of precast concrete units, then post-tensioned and erected for a supermarket roof in Alpena, Mich., this country's first . . .

Tied Arches Made of Concrete Block

BUILT ON THE GROUND on wood forms, the ribs contain two rows of 8 in. block, side by side as shown, and a top layer of 6 in. block. Grooves (arrows) are for tendons.

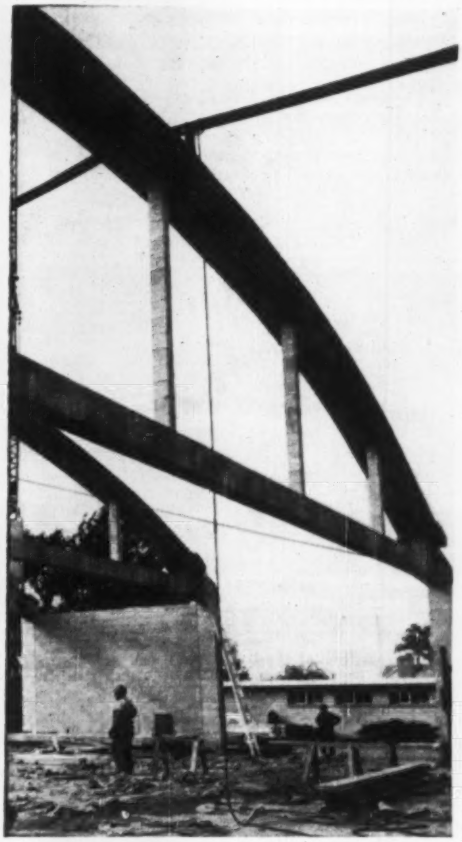
The new Kroger supermarket in Alpena, Mich., contains 15,000 sq ft. of floor space unimpeded by columns; yet the roof is both framed and decked with concrete unit masonry.

Roof framing members of the 100 x 150 ft building are tied arches, spanning 100 ft and spaced 18 ft 8 in. c-c. The main members of the eight arch units—the ribs and horizontal ties—are made of concrete block. They were post-tensioned after assembly with steel-wire tendons. Vertical sag rods are encased in block but not prestressed.

The decking consists of post-tensioned concrete plank, also made of precast blocks.

- **Arch construction**—The rib (top chord) consists of two side-by-side rows of 8 in. high, hollow soffit block, topped with a single row of 6 in. high units. Tendons encased in flexible metal tubes run in special grooves provided for the purpose.

The horizontal tie (bottom chord) is composed of 12 x 16 in. U-shaped lintel block, filled entirely with grout. Four flexible tubes each encase ten ¼ in. prestressing wires.



Span 100 Feet

Sag members each consist of two mild steel rods encased in grout-filled 8 x 8 in. concrete blocks.

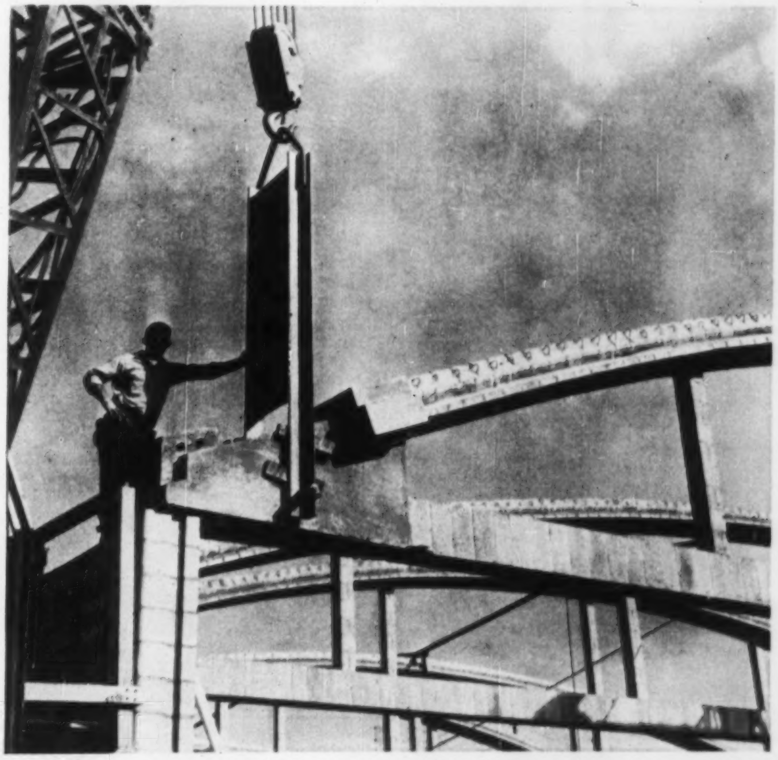
The prestressed plank, spanning about 17 ft clear between the arch ribs, is made up of 6 in. soffit blocks.

• **Two curvatures used**—Arches were made in two shapes, one with 11 ft maximum rise, the other with 13 ft. These alternate in the building, giving the roof in side elevation a shallow sawtooth appearance.

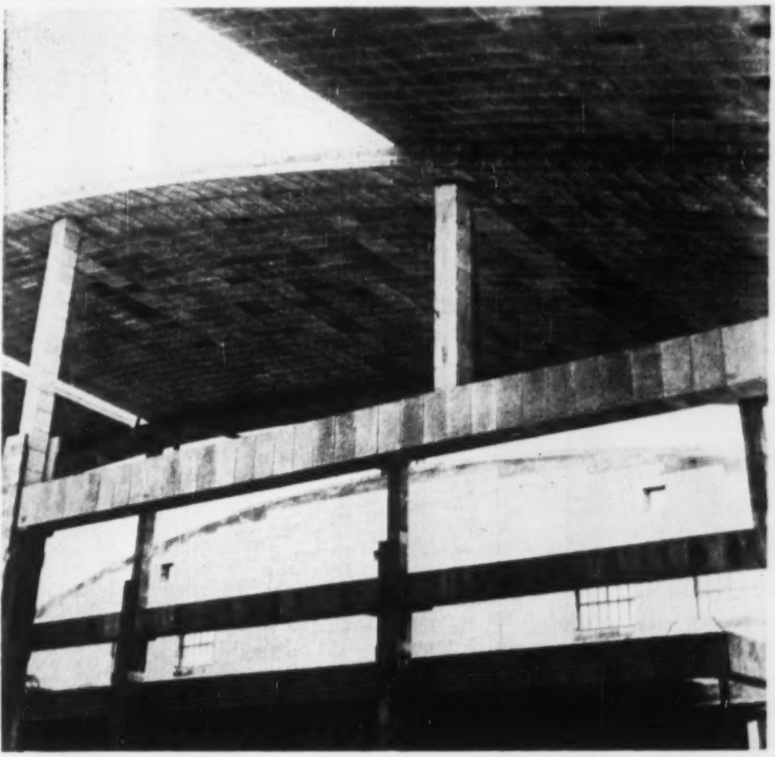
The members were fabricated on wood falsework at ground level on the site. Two cranes were used to erect the arches, which weigh about 20 tons each. Design live load is 40 psf.

All prestressing wires are ¼ in. dia cold-drawn steel, with an ultimate strength of 240,000 psi. Bearing plates for anchoring the tendons are embedded in precast reinforced concrete blocks, which comprise the arch heels.

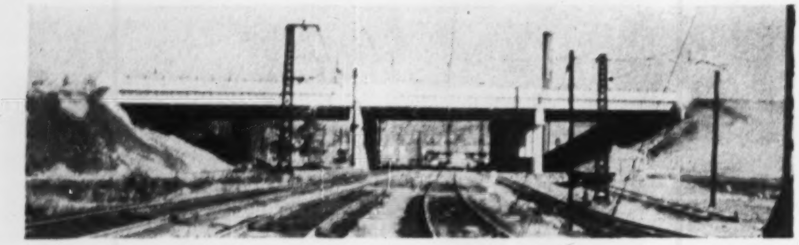
A. Charles Jones, Flint, Mich., is the architect. The masonry arch was designed by the Prestressing Research and Development Corp., San Antonio, Tex. Elasticrete Construction Corp., Alpena, is the general contractor.



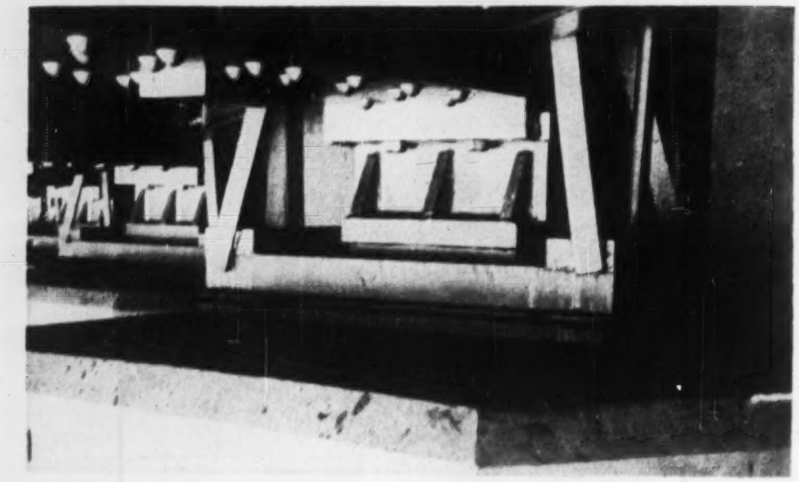
ARCH HEEL, shown here with lifting frame in place during erection, is a precast, reinforced concrete bearing block, with anchors for tendons embedded.



ROOF DECK comprises post-tensioned plank assembled from concrete block. The roof covers an area 100 x 150 ft and contains about 25,000 concrete masonry units.



This Turnpike Bridge Deck Is Level . . .



. . . But Shims Go in to Keep It That Way

Keeping a newly built bridge deck level while one of its abutment footings settles, is a problem now being faced by the Connecticut State Highway Department. Because of an unanticipated substratum of compressible material, an abutment footing and its supporting piles have settled about 17 in. since work on the structure started in early fall last year.

The bridge is a 303 ft long deck-girder structure, carrying the Connecticut Turnpike over one main line and three yard tracks of the Danbury branch of the New York, New Haven, and Hartford Railroad, just west of the Norwalk River at Norwalk, Conn. The substructure consists of two piers and two abutments, all supported by tapered cast-in-place concrete piles.

It is in the east abutment that the settlement has occurred. The abutment is situated in a low area which was (and still is) part of Norwalk's garbage dump. And because it was known, before the footing concrete was placed, that settlement would occur, the Highway Department redesigned the structure to permit periodic jacking of the deck.

From information available, the following facts are apparent:

Original borings taken in the vicinity indicated a stratum of peat and clayey silt extending from El. −2.00 to El. −16.00. At the site of the abutment, borings indicated that the stratum extended only to El. −12.00. From this elevation up to the ground level, no sand or gravel was found.

Since a high fill was to be placed behind the abutment (the pile cut-off is at El. 35.00), it was deemed necessary to remove the unsuitable material before placing the fill. When excavation was started, a stratum of hard compact gravel was encountered at El. −3.00 and El. −4.00. It was decided to stop excavation at this point and begin filling. Almost 40 ft of material was placed for the approaches before pile driving began.

Two test piles were driven in the east abutment area, one 50 ft long and the other 55 ft. The longer of the piles, at a penetration of 43 ft, was getting 46 blows of the hammer (15,000 ft lb per blow) for each foot of penetration. At 47 ft (tip El. −12.00 approximately) only 23 blows were required for a foot of penetration. At 49 ft, the pile was up to 72 blows.

In the actual driving of the 135 permanent piles however, the contractor, although he drove the piles to sustain more than 40 tons, was unable to penetrate the gravel layer.

A few weeks after the test piles were driven, a shear crack in the fill indicated a settlement to be imminent. Additional borings showed that the gravel encountered during the initial excavation overlaid an area of compressible material. Thus, the fill, and in turn the abutment piles which are entirely within it, are settling. At one stage of construction, the abutment settled at about one inch per week.

Commenting to ENR on the occurrence, Newman E. Argraves, highway commissioner, said in part: "It was extremely fortunate that this condition was discovered before any concrete was placed. There were three obvious alternatives: Drive H-piles to rock, over 100 ft in length; remove embankment, remove stub piles, excavate underlying material, backfill and re-drive piles; redesign certain details of the stub abutment to permit longitudinal and transverse movement of the abutment wall and to provide a bearing area for hydraulic jacks to raise the beams to compensate for any settlement.

"The last alternative was predicated on a thorough soil analysis by our soils experts which indicated a total settlement of approximately 13 in. The first alternate was not feasible, since it was not possible at that time to obtain steel piles within six months; the removal of the embankment and underlying soft strata would also have tended to delay the work and proved extremely costly.

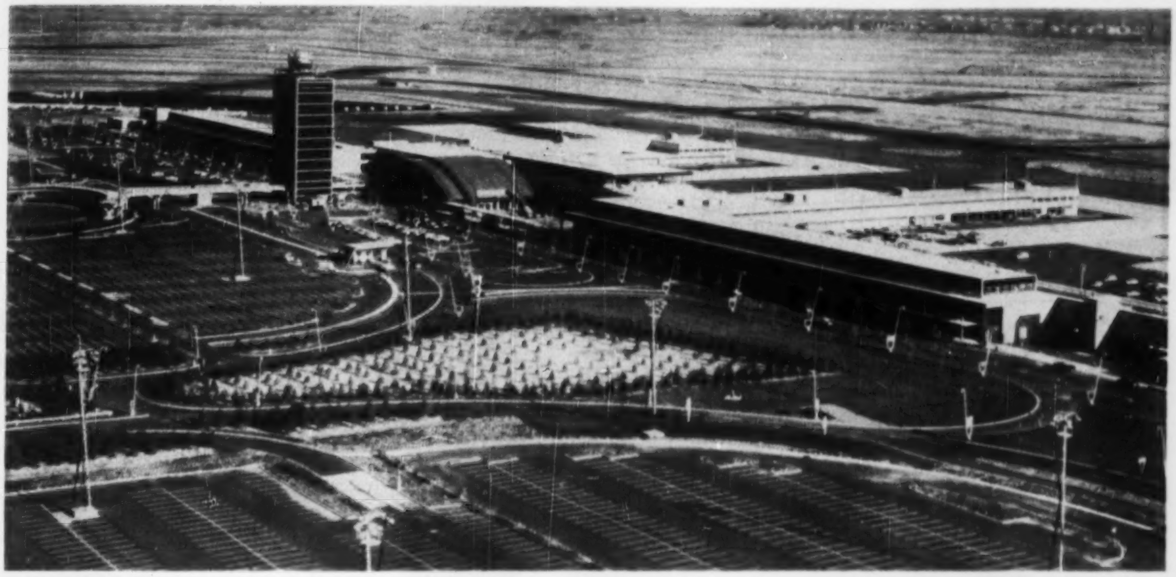
"Since the abutment was of the stub type and a major portion of the total load placed on the compressible material was composed of the weight of the embankment underneath the abutment, it was realized that a major portion of the settlement would occur before the footing was poured. Further, provisions could be made to take care of any settlement involved.

"Therefore, since the abutment could be redesigned to take care of the stresses caused by settlement or lateral movement, the department decided that the correction of this condition, in this manner, would be the most expeditious and economical.

"Settlements observed to date indicate the accuracy of our soils engineers' forecast, and have leveled off to a point where it is anticipated that not more than 3 in. of settlement will occur within the next year, diminishing to zero within the next two years.

"Settlement readings are taken on the abutment at regular intervals. As jacking becomes necessary, it is accomplished by the use of nine hydraulic jacks and the placing of steel shims underneath the sole plates of the structure. The last jacking was performed on November 7. Elevations taken on November 26 indicate a subsequent maximum settlement of .02 ft.

"There is no question as to the structural stability of this unit. The resultant settlement and the corrective measures taken are not visual."



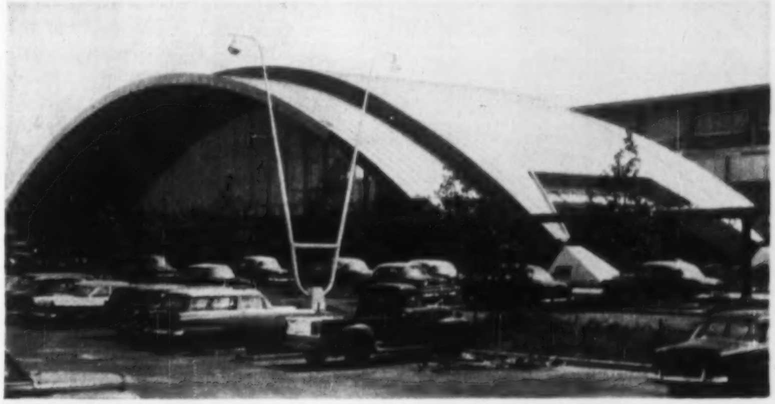
AIR GATEWAY TO THE U. S. is new International Arrivals Building at New York International Airport's Terminal City, a $150 million, 655 acre development where additional buildings costing $97 million are planned for construction by 1960.

New International Air Terminal Opens

New York International Airport's Terminal City goes into operation this week, following formal dedication Dec. 5 of the newly completed International Arrivals Building and two adjoining Airline Wing buildings.

The arrivals building will handle all air travelers entering the U.S. through New York. Three stories high, the steel-framed glass-walled building has 362,000 sq ft of floor space. It houses customs and other entry services plus waiting rooms and business establishments.

The wing buildings, also three-story and of similar construction to the arrivals building, total 225,000 sq ft in floor area. They are occupied by 14 foreign-flag airlines.



MAIN ENTRANCE to new arrivals building is a lobby covered by a stainless-steel arched roof. Principal supports are a pair of three-hinged steel ribs spanning 238 ft.

Among the first major units to be completed in Terminal City (ENR May 2, p. 30) the new buildings cost $30 million. Other parts of the project now in service are parking lots, landscaping, roadways and ramps built at a cost of $16 million; and a $7 million central heating and air-conditioning plant.

Eventually to cost an estimated $150 million, including six terminals for major U.S. airlines, Terminal City started out on paper as a $50 million job (ENR Feb. 24, 1955, p. 28). But growing demands for space forced expansion of the project, and the expected cost climbed successively to $90 million, $120 million and, finally, to its present level.

Most of the unit terminals are still on paper, but Pan American World Airways and Eastern Air Lines have started work. Pan American has begun filling and surcharging on the site of an $8 million building with an elliptical steel-framed, cable-suspended roof (ENR April 11, p. 25). Eastern has driven most of the piles for the foundations of a $12 million three-story building containing 300,000 sq ft of floor space.

United Air Lines expects to start work soon on a $10 million two-story terminal containing 191,000 sq ft of floor space. Trans World Airlines plans an April start on a $12 million building roofed with thin-shell concrete vaults, the preliminary plans of which were made public last month (ENR Nov. 14, p. 28). Northwest Airlines and Northeast Airlines will occupy jointly a terminal building but have not revealed definite plans. American Airlines will start work shortly on a $14 million terminal announced this week.

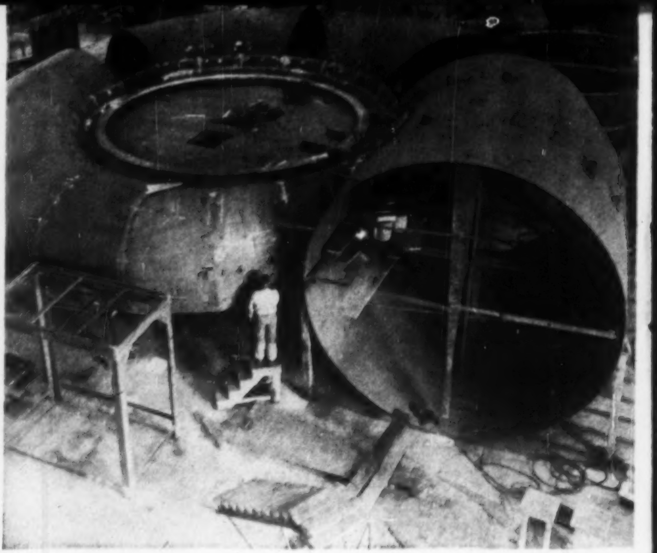
Although not technically part of Terminal City, the 11 story control tower, located at the main entrance to the arrivals building has also been altered considerably. Its bottom six stories, which comprised only open steel members to support the upper floors, have been framed out and closed in to provide office space.

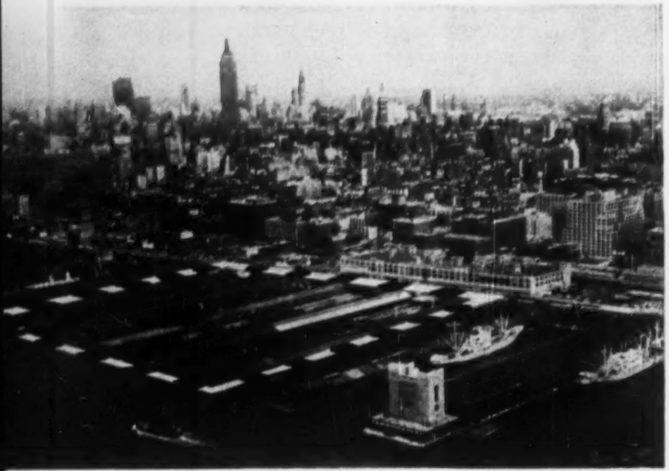
Terminal City was planned by the Port of New York Authority, John M. Kyle, chief engineer, and Thomas M. Sullivan, head of the Aviation Planning Division. Detailed plans were developed in consultation with Wallace K. Harrison, New York architect. Skidmore, Owings & Merrill, of New York, are the architects on the arrivals and wings buildings and the tower.

Engineering News-Pictures

First High Strength Scroll Cases Shipped

The first turbine scroll case to be fabricated of high strength T-1 steel was shipped recently to Brownlee damsite on the Snake River in Idaho. Because of their large size (18 ft inlet dia), the Brownlee units are fabricated in segments and will be welded in the field. The same fabricator, S. Morgan Smith Co., York, Pa., also has completed the first of three T-1 spiral cases for Swift Creek Dam on the Lewis River in Washington. These are smaller units, 11 ft inlet dia, which can be shop welded and stress relieved.





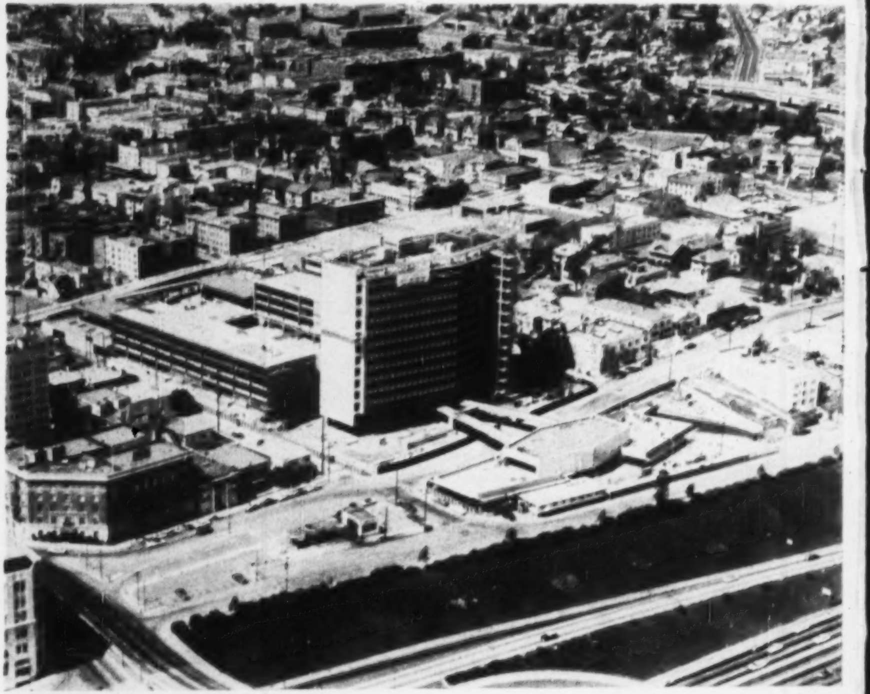
Square Pier for New York

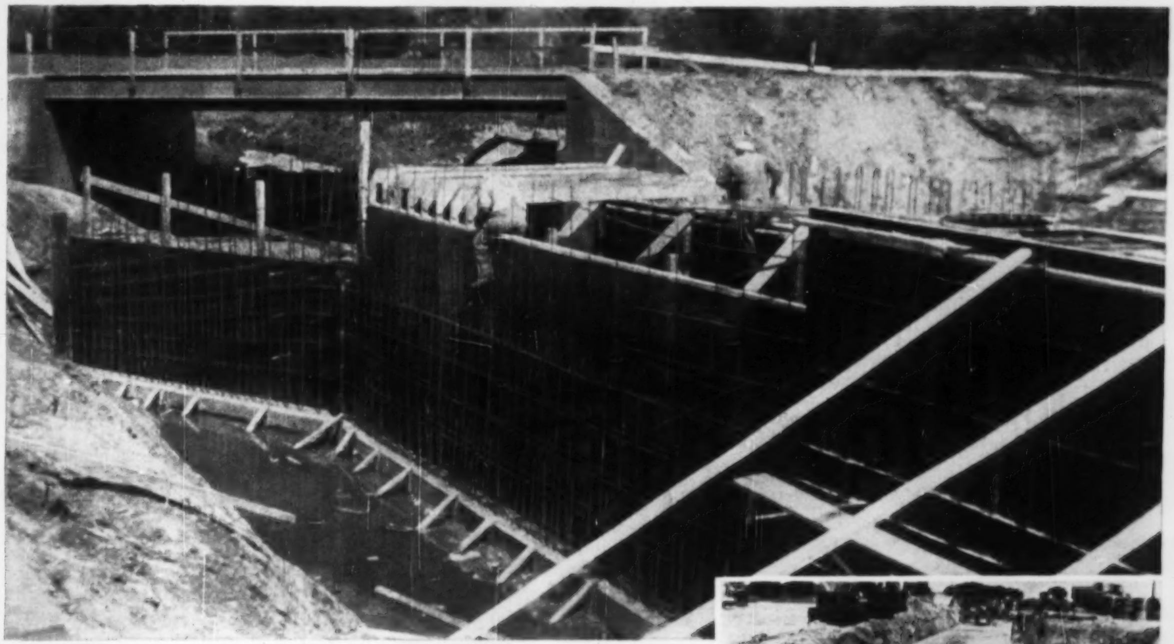
February will see start of work on an $18.7 passenger-cargo terminal for the city's teeming waterfront. Scheduled for lease (at $1.2 million yearly) to Holland-America Lines, the structure will be a huge two-deck square—805x810 ft in size—enclosing a central loading area and replacing five outmoded piers (dotted line). The lease terms—advocated by the city's Department of Marine and Aviation which will build the pier—have been a subject of hot debate for months, on grounds that as much as $500,000 in potential revenue may be lost.

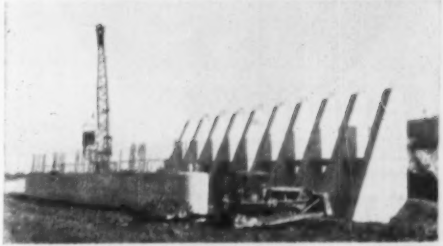
Union Oil's Offices Near Completion

The headquarters of the Union Oil Co. of California in Los Angeles, a four-building complex costing an estimated $20 million, is now more than 80% complete.

A diamond-shaped, 13 story office building is the main structure in the group. Two additional office buildings of 4 and 3 stories located behind the 13 story tower and a 2 story auditorium-cafeteria building in front and across the street from the tower are interconnected by prestressed concrete pedestrian bridges at the mezzanine level.







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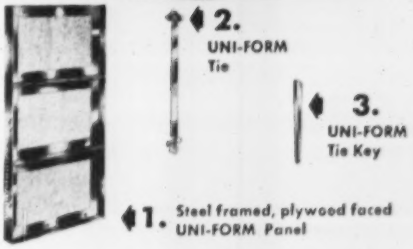

P1501

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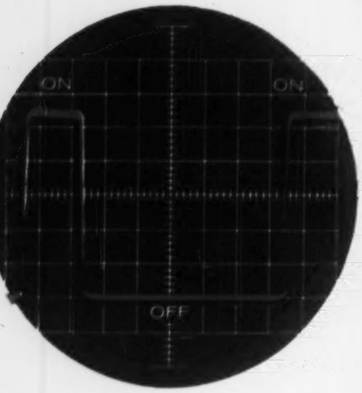
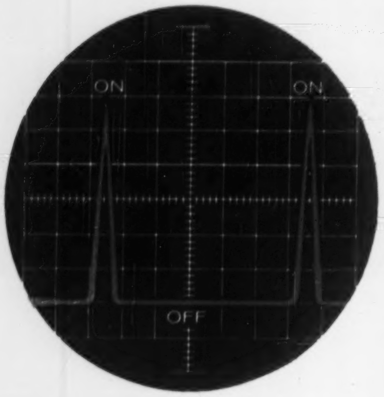
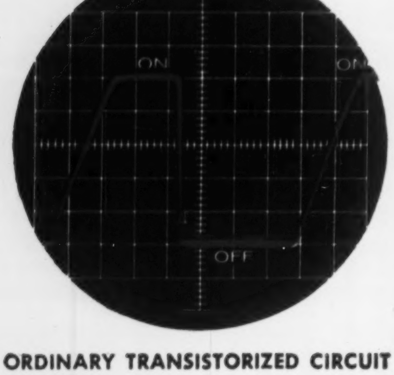


Visi-flash PATTERN. Note squared corners on the pattern produced. Visi-flash is instantly "on"; instantly "off" . . . no light variance, no excessive battery drain. "Off" time is set at optimum length . . . assures a pause long enough to rest the eye and make next flash meaningful.



NEON TUBE PATTERN. The Oscilloscope graphically illustrates "on" and "off" pulses of the light. It shows here that the neon tube flasher has an extremely short "on" time . . . too brief and fast to register strongly on eye and mind.



ORDINARY TRANSISTORIZED CIRCUIT PATTERN. Here, the "on" and "off" timing is not at ideal setting. Angled pattern shows that light strength varies and that excessive drain is set up on batteries as current slowly heats bulb prior to each flash.

ACCIDENT RECORDS indicate that rapidly flashing warning lights are seen, *but not heeded.* That's due to the fact that the human eye retains an impression of a flash from $\frac{1}{50}$ to $\frac{1}{30}$ of a second after it has vanished. If the flashes are rapid enough, the eye may imagine it sees a succession of diminishing flickers that are not there. The result is confusion, not action.

Only a long, steady flash registers a meaningful warning on the human mind. *Only a longer "off" time* enables the human eye to recover from one flash and see the next one clearly. The Dietz Visi-flash is timed to give the most ideal "on" and "off" timing of any flashing signal on the market.

◀ **For Proof, See the Oscilloscope Patterns at Left**

DIETZ ENGINEERS have skillfully balanced the "on" and "off" timing of the Visi-flash with the design, color and area of the lens to produce a warning light that says "STOP — DANGER" in a way that combines visibility with meaning and authority.

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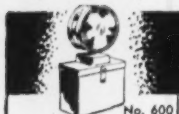
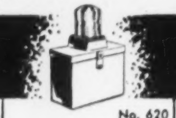


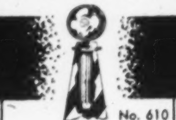
No. 600

Barricade model with double-face lens



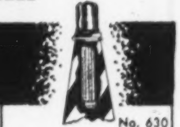
No. 620

Barricade model with 360° lens



No. 610

Traffic Cone model with double-face lens



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Progress and Problems Mark Road Work

Bridge projects dominate the construction scene, but litigation and disputes slow some highway jobs

The vast highway picture in the U.S. continued to be painted more clearly last week, in spite of spatterings caused by numerous disputes, misunderstandings, lawsuits and money squabbles.

The broadest strokes on the canvas concerned large bridge and tunnel projects.

Biggest of these is the long-projected—but just approved—bridge-tunnel to link the DelMarVa (Delaware, Maryland and Virginia) Peninsula with Virginia's mainland east of Norfolk. Plans for this 93,100 ft north-south crossing of the mouth of Chesapeake Bay have been under discussion for many years, as a means of providing a highway between Virginia's eastern shore and its mainland, as well as a coastal north-south route for vehicular traffic.

The state highway commission approved the north-south crossing at an estimated cost of $144 million. Immediately after approval, the Chesapeake Bay Ferry Commission, charged with construction of the bridge-tunnel, formed a committee to negotiate with consulting engineers and to enter into incidental contracts for test borings and necessary preliminary work.

A second major bridge project is under way in the Pacific Northwest. The Washington State Toll Bridge Authority called for bids for a $30.5 million bond issue to finance a floating bridge across Hood Canal in the Seattle-Tacoma area and to improve the ferry system.

For the construction work, a four-firm combine, headed by Morrison-Knudsen Co., Inc., submitted a low bid of $14.3 million for the floating section of the bridge.

A third bridge, in Rhode Island—a freeway structure over the Providence River—neared completion as the last girders were placed. Delays in girder erection had been caused mainly by late shipment of steel. However, all work except blacktopping, will be continued throughout the winter.

In two locations, at least, there is some trouble with plans for bridge construction.

One spot is at Louisville, where an old argument between Indiana and Kentucky over location of a bridge across the Ohio River broke out again. It started when Gov. Harold Handley of Indiana said in an interview in Louisville that the bridge would have to be built on Indiana terms, or not be built for some time. He contended that the bridge should be built away from congested downtown areas of communities on both sides of the river.

The governor's comment brought immediate reaction. Said Louisville's Mayor Andrew Broaddus: "The governor of Indiana is mistaken in his concept of where the bridge ought to be. It should be built where the traffic is."

• Right-of-way—One right-of-way snag is showing up in delayed construction of the North-South Expressway in Louisville, where the U. S. Bureau of Public Roads and local officials disagree on right-of-way acquisition methods. The Kentuckians want to buy the needed property through private real estate brokers on a fee basis.

To justify this stand, Arthur E. Lewis, director of the State Highway Department's right-of-way division, says of the acquisition procedure: "This is quite specialized work, involving a lot of expensive commercial and industrial property, and it just isn't the kind of work our state men can do."

The BPR maintains, however, that any such procedure could lead to abuses, such as have been charged in Indiana—especially since fees in this case alone might exceed $140,000.

And on the question of right-of-way, the Arkansas Highway Department is taking heavy criticism for its lack of action on a $3.3 million river-front project at Little Rock. City and county officials are accusing the department of dragging its feet, but the road bureau blames the city and county for its troubles.

Object of the dispute is the uncompleted La Harpe Boulevard, planned as a 4 lane, 16 block, east-west expressway along the Arkansas River. Little Rock voters approved a bond issue to finance the city's share of the cost five years ago, and construction was to have taken only three years. So far, about $1.5 million has been spent and the project is about half finished.

Highway department officials claim that right-of-way acquisition has been the difficulty. They say they have contracted the work as fast as the city has cleared the right-of-way.

• Roadbuilding disputes—The roadbuilding program is having more than its usual number of misunderstandings, lawsuits and money problems, however.

In Tennessee the long-standing battle between asphalt vs. portland cement concrete is being fought. State Highway Commissioner W. M. Leech, in refereeing the bout, maintains that the material to be used must depend upon topography and the use to which the road will be put. He holds that concrete is better especially in hilly areas, while asphalt pavements are generally more economical where long, flat roads can be built.

Montana's highway department, plagued with a shortage of highway funds, is, according to State Highway Engineer Fred Quinnell, Jr., faced with "a critical financial situation." He stated that not only did the recent legislature fail to give the department extra money for interstate work, but it also reduced the gas tax, thereby costing the state about $2.4 million in revenues this year. A final blow was provided by a 1957 act that requires the state to pay 75% of the cost of moving utilities now on rights-of-way, if such a relocation is made necessary by road construction.

To contest the constitutionality of this 1957 act, a suit has been filed which maintains that highway funds derived from fees, licenses or gasoline taxes can be used only for highway purposes. The complaint charges that payment for moving utilities is not a "highway purpose."

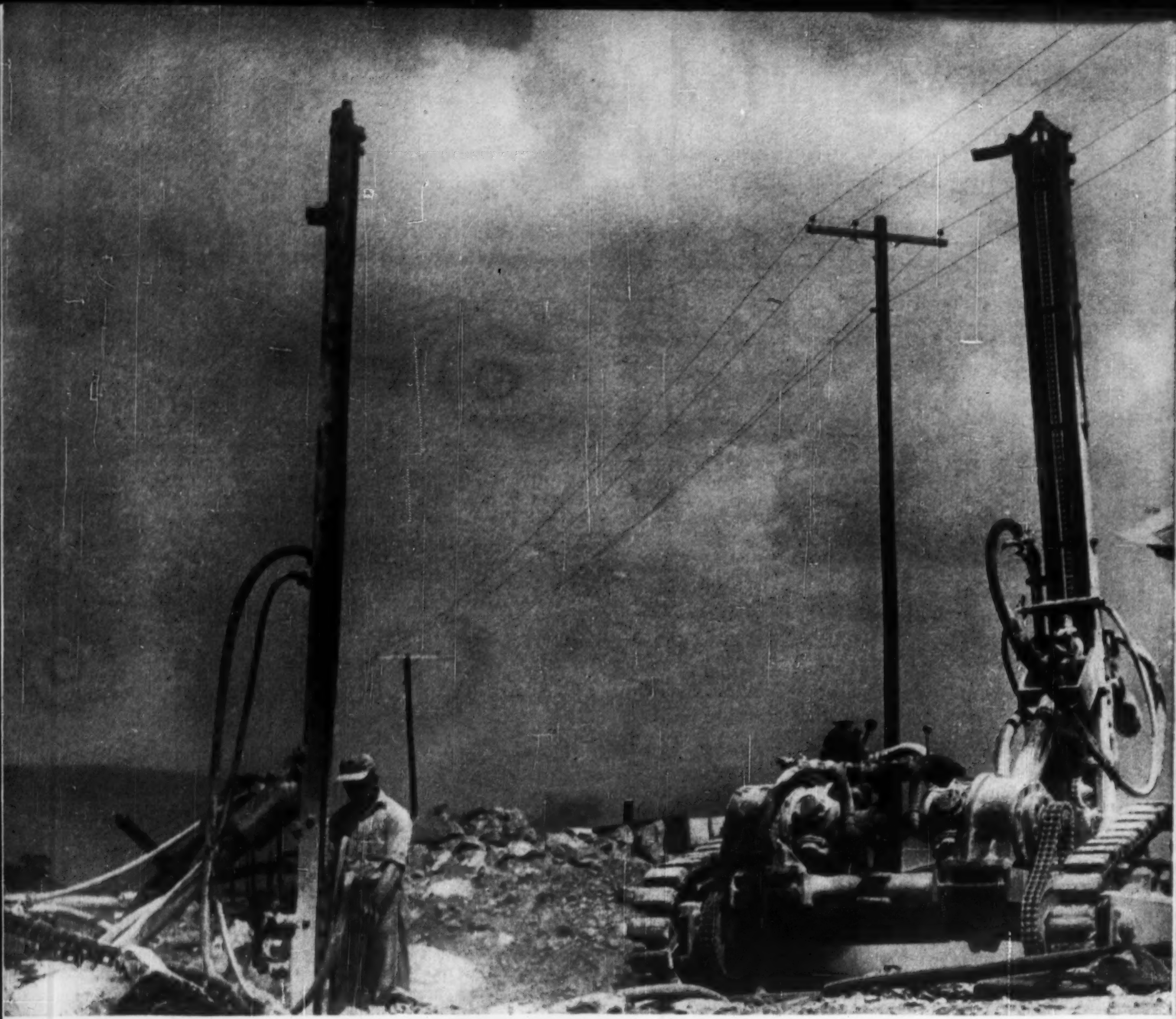
Vermont also is having trouble getting money—but for a different reason.

The state disqualified two Minneapolis firms from bidding on construction jobs because, in the words of Cleon Perkins, chairman of the Vermont State Highway Board, they "engaged in practices which the board cannot condone." The contractors, S. J. Groves and Alexander Construction Co., appealed to the Bureau of Public Roads, who stopped all federal aid funds to the department. The BPR holds that Vermont's complaint is not sufficient grounds for the disqualification.

Vermont's action resulted when an option on a stone quarry held by two unsuccessful bidders on an interstate road job was sold by them to the successful bidder at a profit of $10,000. Normal practice, according to the highway board, is for unsuccessful bidders to turn over options on materials to the successful bidder at cost.

Vermont officials claim that approval of such actions could lead to greatly increased highway costs, not only in Vermont, but throughout the country. Gov. Joseph B. Johnson has backed the department's stand and has asked U. S. Sen. George Aiken to seek a settlement of the dispute.

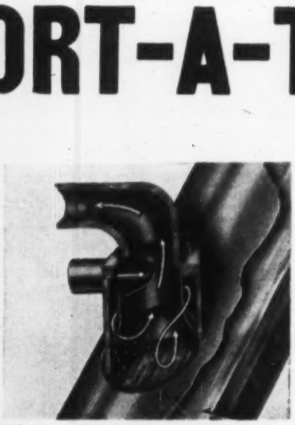
Meantime, Vermont is getting no federal aid for any of its road work.



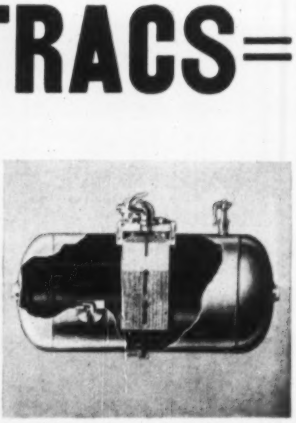
1 ROTARY + 2 PORT-A-TRACS=

Accessibility. We removed all principal working parts of the compressor and replaced them in forty minutes—and we did it using only standard tools.

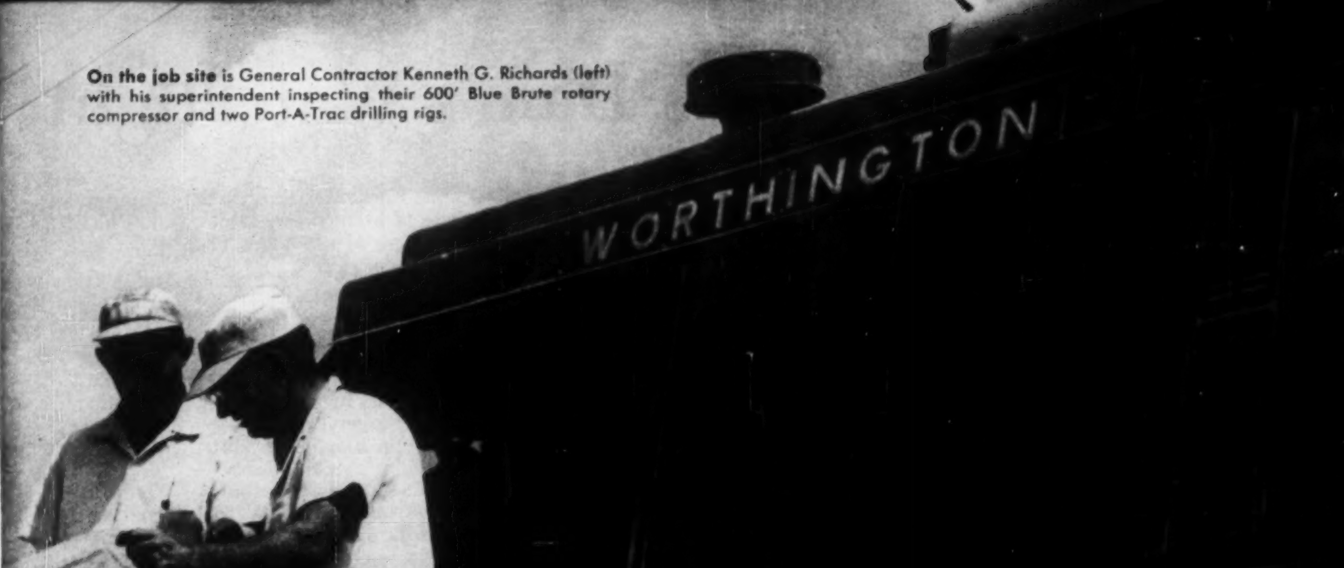
Starts every time, even in cold weather, because the Blue Brute's clutch allows you to warm up the engine without engaging the compressors.



Lifetime filter is a vortex separator connected to the compressor discharge which removes 95% of the oil from the air. Filter never needs replacement



Final filter, located in the air receiver, removes the last 5% of the oil. This filter is a long life, low-cost replacement part—easy and inexpensive to renew.



On the job site is General Contractor Kenneth G. Richards (left) with his superintendent inspecting their 600′ Blue Brute rotary compressor and two Port-A-Trac drilling rigs.

Equipment supplied by American Equipment Corp., Mechanicsburg, Pa.

2,400 YARDS OF ROCK A DAY

One rotary compressor and two drilling rigs are breaking all performance records on a new stretch of highway in Franklin County, Pennsylvania. Here's what General Contractor Kenneth G. Richards has to say about this Worthington team.

2,400 yards of rock a day. "Our Blue Brute rotary compressor is teamed up with two Blue Brute Port-A-Trac drilling rigs. The 600′ rotary operates the Port-A-Tracs constantly at full capacity. So far, we've removed over 40,000 yards of rock. We're averaging about 2,400 yards of rock per eight-hour day. That's really moving rock."

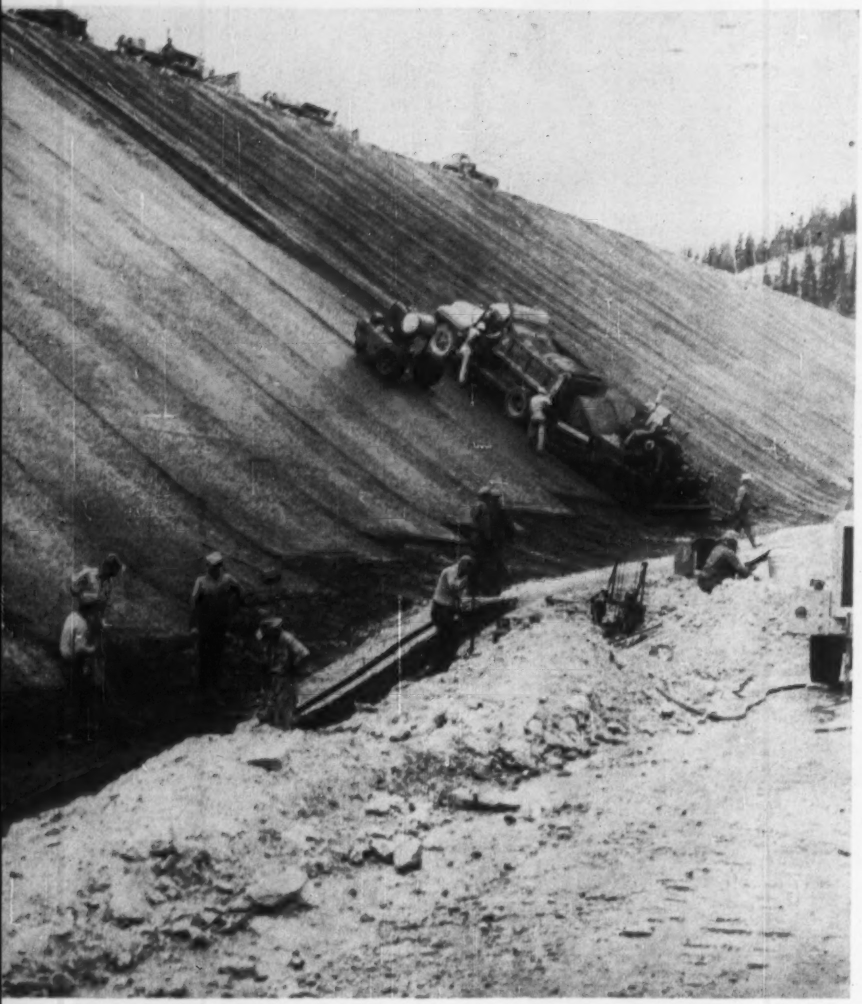
Accessibility. "You hardly ever have to fool with a Blue Brute rotary," says Mr. Richards, "but it's good to know they're easy to take apart and put back together. Every moving part is at your fingertips.

"As part of our periodic maintenance inspection program, we recently removed all the principal working parts of a Blue Brute rotary and replaced them in forty minutes." This rugged simplicity and accessibility is winning new friends for Blue Brute rotaries every year.

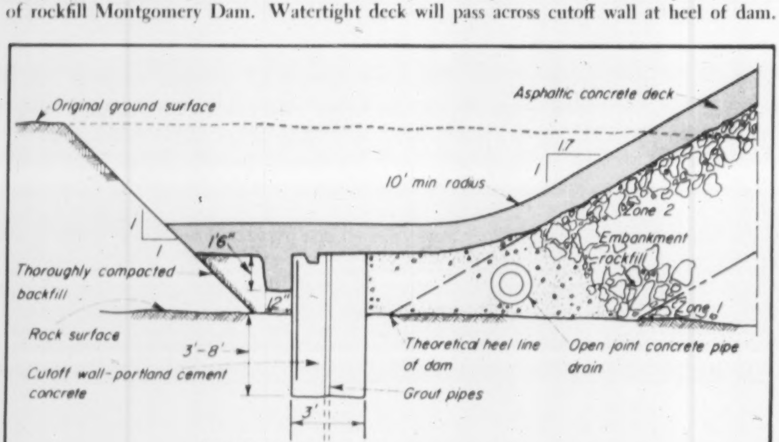
Blue Brute rotary compressors are available in 125′, 210′, 315′, and 600′ sizes from your nearby Worthington Blue Brute distributor. See him for a demonstration. Worthington Corporation, Harrison, N. J. In Canada: Worthington, Ltd., Brantford, Ont. H.7.2

WORTHINGTON

Asphaltic Deck Is Dam's Watertight



ASPHALT-PAVER puts down one of three layers of asphaltic concrete on upstream face of rockfill Montgomery Dam. Watertight deck will pass across cutoff wall at heel of dam.


Original ground surface
Asphaltic concrete deck
1
17
10' min radius
Zone 2
Embankment rockfill
Zone 1
1
1
1'6"
12"
Thoroughly compacted backfill
Rock surface
3'-8'
Cutoff wall-portland cement concrete
Theoretical heel line of dam
Open joint concrete pipe drain
Grout pipes
3'
Grout holes

DECK HOOKS behind cutoff wall to ensure tight bond over bigger area.

A black sheet covers the upstream face of Montgomery Dam on the Middle Fork of the South Platte River in Colorado.

The sheet is asphaltic concrete, a watertight deck for the coreless rockfill structure. It stands as the first U. S. application of such a deck to a rockfill dam. And it is possibly the first time in any part of the world where an asphaltic concrete covering, by itself, supplies the watertight membrane for a rockfill dam.

(The unusual structure was described in a paper by F. W. Scheidenhelm, John B. Snethlage and Arthur N. Vanderlip, presented at the recent annual meeting of the American Society of Civil Engineers and to be published in full in an early issue of the Journal of the Power Division of the Society. This article is based on that paper.)

The 113-ft-high, 1,900-ft-long dam was built by the City of Colorado Springs for its municipal water supply (ENR Nov. 15, 1956, p. 44). It forms a reservoir of only 95 acres with a volume of 5,100 acre-ft and is to be used for seasonal storage of water, which will be delivered to the city by a 30 in. steel pipeline.

The dam is of granite quarried from the mountainside. Downstream slope of the fill is 1.4:1; upstream slope is 1.7:1.

Over the surface of the upstream rock, and in addition to a "leveling course," is laid a 10½ in. thick blanket of asphaltic concrete put down in three continuous layers. The first was 4 in. thick, the second 3½ in. and the last 3 in.; all were measured after compaction by a vibratory roller.

The asphaltic concrete contains approximately 8.5% (in terms of weight of dried aggregate) of steam refined paving grade asphalt as binder. Aggregate for the mixture came from glacial deposits occurring in the vicinity of the dam.

• Why such a scheme?—A rockfill dam with asphaltic concrete watertight deck was picked for Montgomery for a number of reasons—the economic reason being that it would run less than estimated cost for any other type of dam affording equivalent advantages. Also, in an area where the construction season is exceedingly short, it is believed the use of the asphaltic concrete as a deck saved a year's time; the 27,700 sq yd of cover were placed in less than two months.

The inherent properties of the material also made it advantageous to

Layer

use. For one, the deck will be self-adjusting to any settlement normally taking place in such a dam. Flexible at ordinary temperatures, the deck also will be considerably flexible at temperatures as low as freezing, an annual condition in the dam area. And should some cracking occur, the asphaltic concrete may be self-healing. Repairs, if necessary, will be relatively easy to make.

Also, the material lends itself to placement on slopes as steep as 1.5:1, as tests have shown, and remains stable even if surface temperature goes to 140 F. The covered slope at Montgomery is 1.7:1.

Finally, the height of the dam may be increased in the future by as much as 50 ft. Coverwise, such an increase would be met by simply extending the deck upward at the same slope and extending a cutoff wall and seal up the abutments.

• **A stable work base**—An asphalt paver was used to lay down the asphaltic concrete deck. Construction operation also involved a shop-built turntable placed atop the dam to turn and move trucks and paver (see box). But before the paver could go to work, the rock surface had to be prepared to provide a stable surface for the heavy paver.

The rockfill is divided into two zones. Zone 1, the major part of the fill, is made up of rock that was permitted to contain up to 10% fines (4 in. or smaller). Zone 2, which lies on the upstream face; is a 5-ft-thick rock blanket. In this zone, material was kept free of any rock 3 in. and smaller to permit free drainage under the asphaltic concrete.

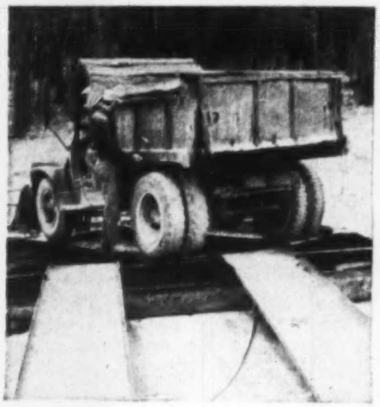
Over the rock of Zone 2 went a layer of ¾ to 3 in. rock, which was so compacted by a vibratory roller as to fill the larger interstices of the surface. This was done to avoid local settlement under the weight of the paving machine and to present a fairly smooth surface to take the deck.

However, it still was not enough to give a stable surface to support the paving equipment. And even the application of a penetration coat of asphalt binder did not do the job. The answer was a "leveling" course of asphaltic concrete; the same mix as would go into the deck. It was put down by trucks rolling with tailgates open, and supplemented by hand work. A single pass of a vibratory roller and the result was a course that ran about 1 to 3 in. thick. The slope was then ready to accommodate the paving machine, which did the job in three passes across the dam.

• **Hooked to cutoff**—There is a reinforced portland cement concrete cutoff wall at the upstream side of the dam. Located a slight distance upstream of

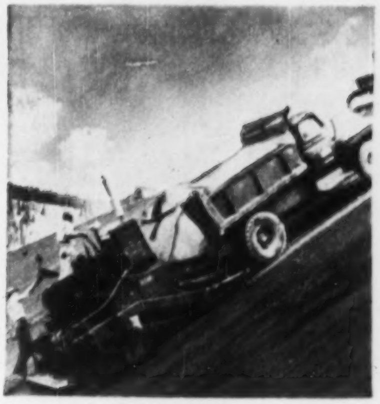
(*Continued on page 38*)

HOW THEY DID IT



TURNTABLE, shop-built, is used to turn truck on crest roadway before it is let down dam slope to waiting paving machine.

PAVER is taken from slope by turntable so that it can be skidded by tractor to new position to start another strip.



WINCHED UP on separate cable, paver is fed by truck as it puts down 12 ft wide strip of asphaltic concrete on dam face.

Turntable Is Key to Fast Slope Paving

Design called for a watertight asphaltic concrete facing on the upstream slope of rockfill Montgomery Dam. The problem was how to put down the desired foot thick blanket of the material on the 1.7:1 (or 58%) slope of the 113 ft (maximum) high dam. The solution involved a standard asphalt-paver, trucks, winches, cables —and a shop-built turntable.

The turntable scheme was developed by holders of the $350,000 paving contract—San Ore Construction Co. of McPherson, Kan.—to facilitate the movement of trucks and pavers up and down the dam slope.

Turntable frame measured 22x20 ft and swung in a 16 ft dia circle. It revolved around a 4 in. center pin fitted with twenty 1¼ in. steel balls, with the outside of the assembly resting and moving over eight 1½ in. roller bearing shafts.

Corrugated steel plates, 18 in. wide and 18 ft long, set on the table took the trucks. Similar plates formed ramps leading up to the turntable.

The turntable was fitted with two electric-powered variable-speed winches—one for the trucks and one for the paver. This enabled each to move independent of the other, allowing the paver to work uninterrupted.

Sequence of operations was for the paver to start at the bottom of the slope. **A loaded truck would drive along the crest road of the dam and onto the turntable, which was then turned 90 deg by workmen. The truck was winched down to the paver and then both pulled up the slope, the paver laying a course as it moved.** When empty, the truck was brought back up to the turntable, turned and sent off to the asphalt plant for another load, while another truck was let down to the paver.

After the paver had put down a full strip—which was 12 ft wide—it was taken on by the turntable. Tractors skidded the whole business to the next position and the paver was let down again. The paver made three full passes across the dam face, depositing some 20,000 tons of asphaltic concrete in layers of 4, 3½ and 3 in. thick, measured after compaction.

A vibratory roller, handled by cable working from a tractor atop the dam, was used to compact the layers in one pass per layer.

. . . Asphaltic deck

the intersection of dam slope and foundation rock, the wall is 3 ft wide, extends 3 to 8 ft into, and projects a few feet above, the rock.

The asphaltic concrete deck runs from the crest down the slope and executes a 10 ft minimum radius curve in the heel area of the dam so that it passes across the top of the cutoff wall horizontally. It then continues on a few feet upstream of the wall. In this way the dead weight of the deck and water pressure of the filled reservoir force a watertight bond between wall and deck.

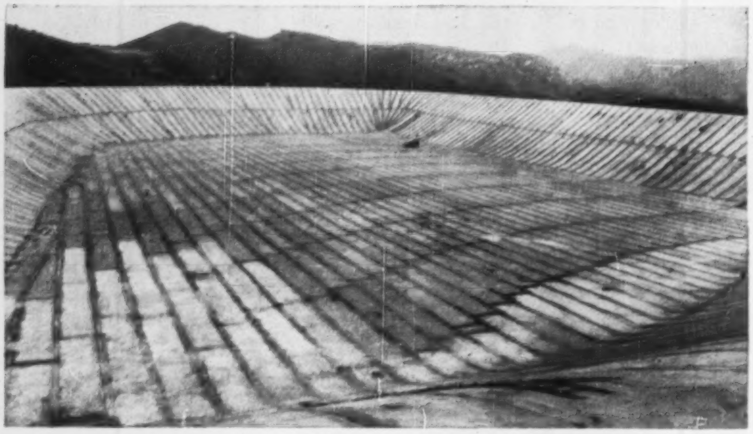
An additional precaution was to have the deck bulge into a "hook" measuring 12x18 in. in section behind and against the upstream face of the cutoff wall. This, in effect, extends the deck down into compacted backfill, increases bond between wall and deck and further decreases chances of leakage between wall and deck.

• **Ponding pressures**—Since the reservoir is to be drawn down annually, one possible danger to guard against is the ponding of water behind the deck. Such collections of water—either from leakage or seepage—could exert pressure and push out the deck from within when the reservoir water pressure is absent from the face of the deck.

Preventing such ponds is accomplished partly by the makeup of the rockfill under the deck. And a positive drainage system does the rest. This consists of an open joint concrete drain pipe, 18 in. in diameter, installed along the entire cutoff at the bottom of Zone 2. At the lowest point of this drain a connecting transverse pipe provides outlet to the riverbed downstream.

• **Another coming**—This new technique for rockfill dams is already being considered for another project. A hydroelectric development tentatively scheduled for construction in 1958 involves a dam twice as high as Montgomery at Roanoke, Va. It has been figured that a dam at the site would be economically feasible only on the basis of rockfill with asphaltic concrete deck.

The engineering aspects of the Colorado Springs' project for additional water supply and the construction of Montgomery Dam were in charge of Black & Veatch of Kansas City, Mo. On the design, specifications and construction of the dam, the office of F. W. Scheidenhelm, including the co-authors of the ASCE paper, served as consultant to Black & Veatch. For the city, the project fell under the Water Department, J. S. Nichols, superintendent, and in turn the Department of Public Utilities, R. D. Nixon, manager.



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10-TON CRANE LOADS on monorails inside the tunnel of the Piney Branch Storm Sewer project are supported by Commercial ribs and plates in addition to the tremendous overburden.

ACCURATE TOOLING before delivery on the job simplifies and speeds up shoring operations. Bolt holes in ribs and liner plate flanges line up perfectly.

"THEIR SHORING STRENGTH IS VIRTUALLY GUARANTEED," is James L. McLlvaine's comment about the steel tunnel liner plates and ribs supplied by Commercial.

Supports tunnel overburden plus 10-ton crane loads

"Commercial steel liner plates and ribs are being used on our Piney Branch Storm Sewer project in Washington, D.C. because their shoring strength speeds safer tunneling and cuts costs," says James L. McLlvaine, Project Manager.

Seven key men in the Underground Construction Company, contractors on the job—representing over 100 years of combined tunnel-driving experience—chose Commercial steel plates and ribs for the structural support while driving this 4,300-foot tunnel.

EASY TO INSTALL Commercial liner plates and curved ribs are contributing to the rapid advance on the job indicated Mr. McLlvaine—are helping make possible daily progress of about 10 to 15 feet in the mining and shoring of a tunnel 20-feet, 4-inches in diameter through mica schist which deteriorates upon contact with air and water. One man handling of the Commercial plates and rib segments is routine.

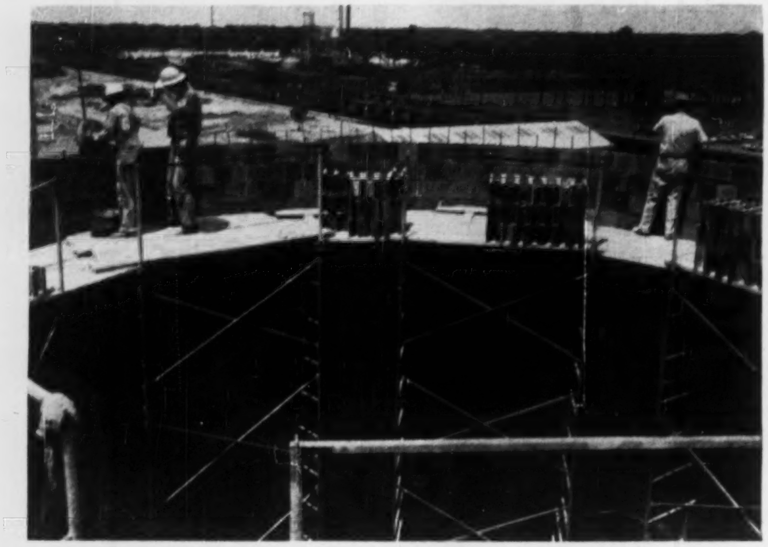
COST CUTTING FEATURES are designed right into Commercial tunnel supports. Because these steel liner plates are bolted directly to the web of the formed ribs, at least two inches of mining outside of the pay line—or a total of 800 cubic yards—is being saved on the entire project.

STEEL PROTECTION moves right along as mining progresses—leaves no area unprotected. The superior shoring strength of Commercial ribs and plates provides complete protection for sandhogs working 100 feet below the surface.

COMPLETE ENGINEERING ASSISTANCE is available to help *you* with your next tunnel project—sub-surface or surface, long or short. Take advantage of Commercial's 25 years of experience in the design of supports for soft ground or rock tunnels. There's no obligation. Address inquiries to The Commercial Shearing and Stamping Company, Dept. E-49 Youngstown 1, Ohio.

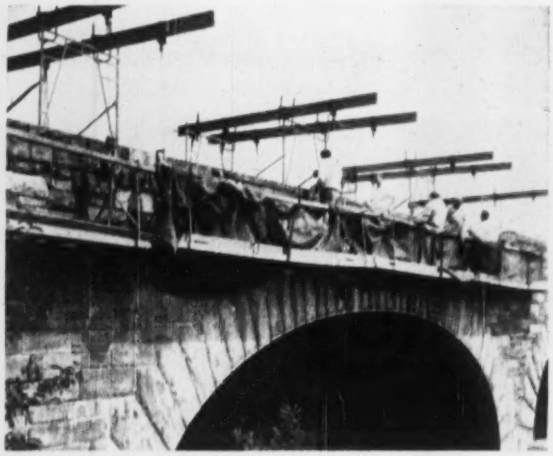
COMMERCIAL
shearing and stamping

Scaffolding Methods . . . by Patent Scaffolding Co.

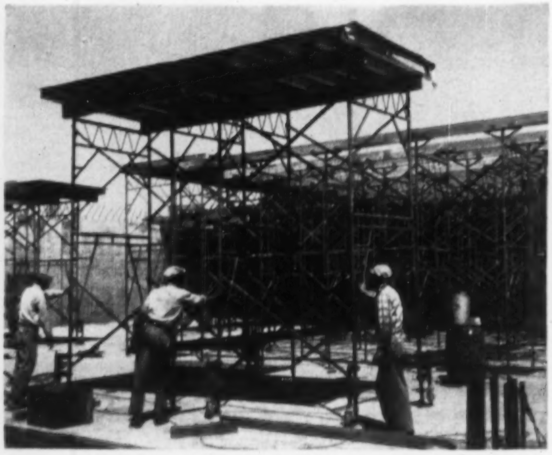


SAFE, 80'-HIGH MASONS PLATFORMS — To provide safe, steady, easily-erected platforms for masonry work on six 35'-diameter, 80'-high silos for the Masonite Corp. plant in Laurel, Miss., contractors, Stebbins Engineering Co., use "Trouble Saver"® Scaffolding. 440 5'-wide mason frames support a material runway between silos and 1530 4'6"-wide "Trouble Saver" mason frames are erected inside for laying tile. Additional scaffolding units are quickly added as the job progresses, keeping masons and material always within easy reach of the work.

Note steel guard rail at top in this photo for extra safety. Prefab frame and diagonal brace components of "Trouble Saver" Sectional Steel Scaffolding assemble quickly to exact height and length requirements.



HANG TO BRIDGE REPAIRS OVER TRAFFIC — 4 "Gold Medal"® Junior Safety Swinging Scaffolds provide quick, safe platforms for repairs and tuckpointing on a bridge over Grand Central Parkway, L. I., N. Y. I-beams, secured to counter-weighed benches erected from "Trouble Saver" Scaffolding frames, support scaffolds. These "Gold Medal" Scaffolds are suspended from $^5/_{16}$", galvanized steel wire rope, and are raised and lowered by light-duty Machines, operating with a direct ratchet for speedy raising, and worm and gear for safe, smooth lowering. Haskel Construction Co., contractor.



SHORING ROLLS FROM POUR TO POUR — By using rolling "Trouble Saver" Shoring, Binkele Construction Corp. moves the shoring with forming lumber in place from one pour to the next on the new Sears Roebuck & Co. store, Lancaster, Pa. 1000 frames of "Trouble Saver" Shoring are in use and help speed concrete work by saving valuable time in replacing and restripping of forms. For movement, shoring is lowered by adjustable legs. Then 8" caster attachments are secured to legs. Turning handle atop casters raises shoring for rolling to new pour positions.

To help you with your scaffolding and concrete shoring methods, PS offers a complete nation-wide engineering service available to you locally. See the Yellow Pages in your 'phone directory for the nearest Patent Scaffolding office or representative that sells and rents "Gold Medal" Scaffolds.

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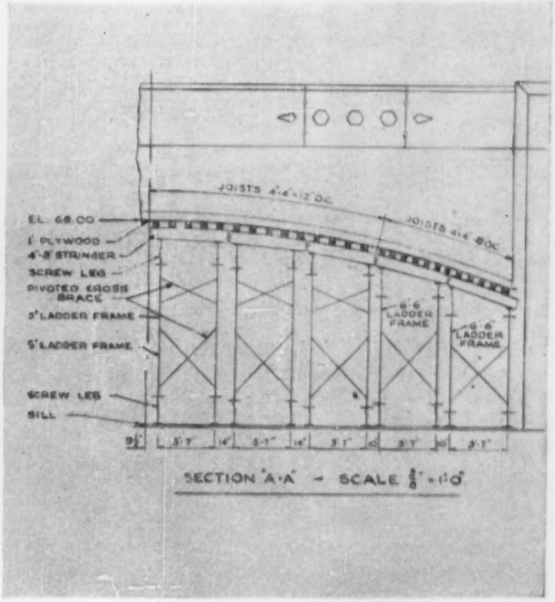
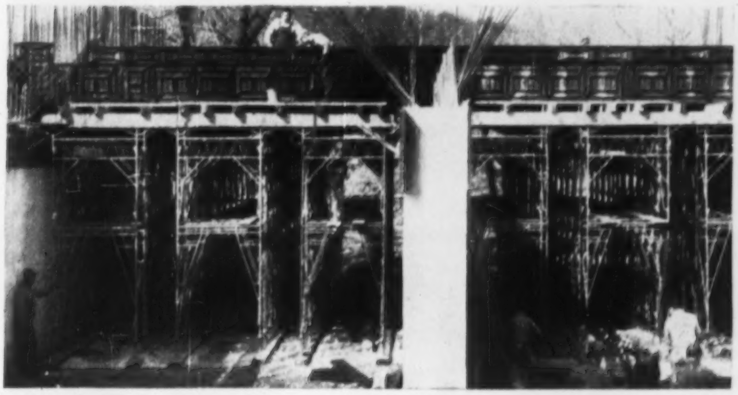
SIMPLE BRIDGE SHORING — Light-weight, easily-erected, prefab sections of "Trouble Saver" Steel Shoring eliminate heavy timbers (and cranes to handle them) for contractor, Matthew J. Reiser, Inc., on this job. 146 2'-wide ladder frames, 105 5'-wide frames and 196 14" U-heads provide ample support with minimum equipment for overpass on an exit road from the Wilbur Cross Parkway, Wethersfield, Conn.


JOISTS 4'·4'·12" O.C.
JOISTS 4'·4'·8" O.C.
EL. 68.00
1" PLYWOOD
4"·8" STRINGER
SCREW LEG
PIVOTED CROSS BRACE
3' LADDER FRAME
5' LADDER FRAME
SCREW LEG
SILL
6'·6" LADDER FRAME
6'·6" LADDER FRAME
9½"
5'·7"
14"
5'·7"
14"
5'·7"
10"
5'·7"
10"
5'·7"
SECTION "A-A" - SCALE ⅜" = 1'-0"

PS Co. ENGINEERED LAYOUTS—Complete, accurate shoring layouts are a regular part of PS Co's engineering service available thru nation-wide offices or representatives that *sell* or *rent* "Gold Medal"® Scaffolds. See classified 'phone directory for your local source. Included are recommendations for joists, stringers, and every component to provide the safest, most efficient and economical shoring.

Shoring Methods . . . for Highway Construction by The Patent Scaffolding Co., Inc.

DUAL PURPOSE—Here, "Trouble Saver" Scaffolding speeds erection of form-work for above-ground pier shells and supports platform for vibrating machines and workers on a New York State Thruway overpass.



CUTS SHORING COSTS 25%—Mal-Bros Co., contractor on this street relocation bridge in Scotch Plains, N. J., formerly used only wood shoring methods. On this project "Trouble Saver" Steel Shoring was used. 272 frames, quickly assembled in 3' by 5' towers and in rows spaced 2'6" apart, provide faster, easier shoring for the job. The contractor reports savings of 25%.

Get full details on cost-cutting ways to use steel shoring and scaffolding in Highway work

The Patent Scaffolding Co., Inc. 38-21 12th St., Dept. ENR Long Island City 1, N. Y.

Please send your Bulletin G-208 on steel shoring and scaffolding for Highway work

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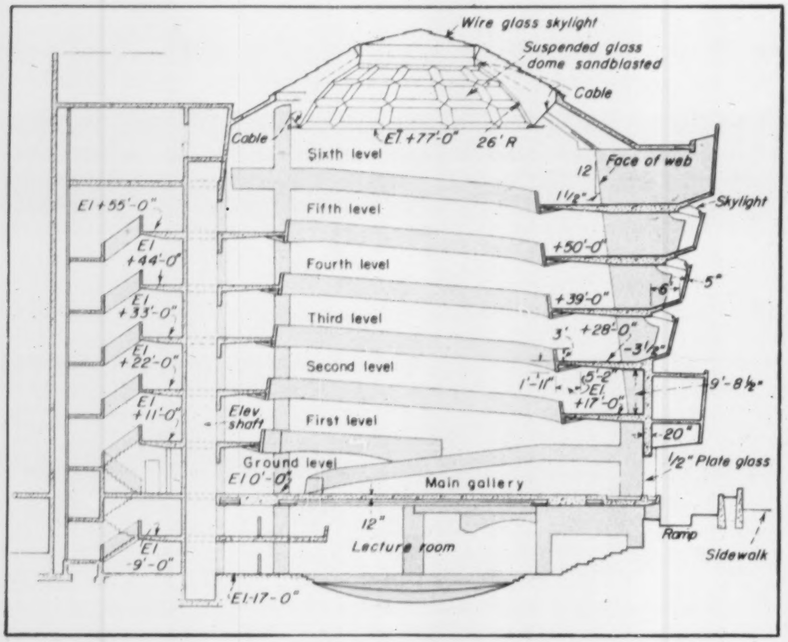
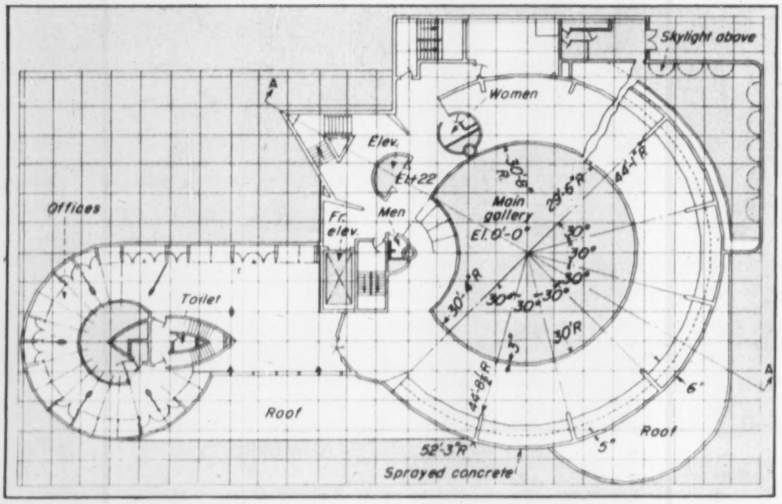

Wire glass skylight
Suspended glass dome sandblasted
Cable
Cable
El +77'-0"
26' R
Sixth level
12
Face of web
1½"
Skylight
El +55'-0"
Fifth level
El +44'-0"
+50'-0"
Fourth level
El +33'-0"
+39'-0"
6'
5"
Third level
3'
+28'-0"
3½"
El +22'-0"
Second level
1'-11"
5'-2"
El +17'-0"
9'-8½"
El +11'-0"
Elev shaft
First level
20"
Ground level
El 0'-0"
½" Plate glass
Main gallery
12"
Lecture room
Ramp
Sidewalk
El -9'-0"
El -17-0"

Guggenheim Museum in New York City will display its works of art along the outer wall of a ramp that spirals up from the main floor and terminates after six turns just below a huge glass dome. Cast with precision in concrete . . .

GROUND FLOOR, to be supported on six columns in a 64 ft dia ring, has reinforce-

Spiral Art Museum Is Built Like a


Skylight above
A
Women
Elev.
El+22
30'-8" R
29'-6" R
44'-1" R
Main gallery
El. 0'-0"
Offices
Fr. elev.
Men
30°
30°
30°
30°
30°
30'-8" R
30'R
Toilet
5"
A
6"
44'-8½" R
Roof
Roof
5"
52'-3" R
Sprayed concrete

AT SECOND LEVEL museum wing (right) is connected with a circular, four-story administration wing (left). Section AA is shown at the top of this page. Points at each level are located with respect to an 8 ft grid, shown superimposed on the plan, or by polar coordinates, as indicated in the museum-wing plan.

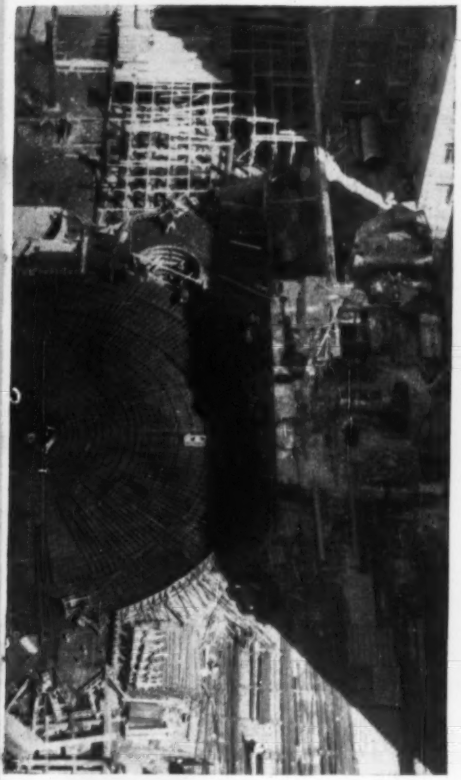
Thanks to a contractor's painstaking attention to detail and careful control of concrete, Frank Lloyd Wright's imaginative design for the Solomon R. Guggenheim Museum in New York City is rapidly approaching reality.

Following the shape of its exhibition space, the building resembles a compressed spring. Its outer concrete wall circles around and up from the ground with gradually increasing radius.

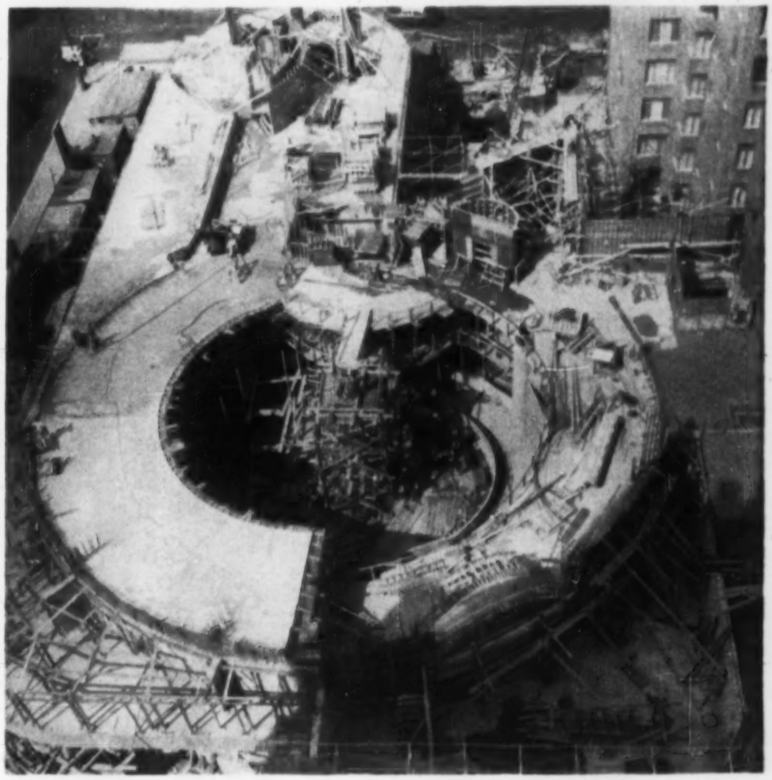
Pictures on display will be hung on the sloped inner face of this wall and will be observed from a spiral concrete ramp that determined the shape of the wall. The ramp cantilevers inward from thin, tapered concrete columns, called webs, that are spaced uniformly along the inside of the wall. On top of the building is a huge glass dome.

Wright selected this scheme because it offers a simple, direct route for visitors to the art gallery and provides what he considers an economical structural design. It also enabled him to use both daylight and artificial lighting to good advantage in the display areas.

However, as ingenious as this design



ment placed radially and concentrically on the plywood forms for a 12 in. slab.



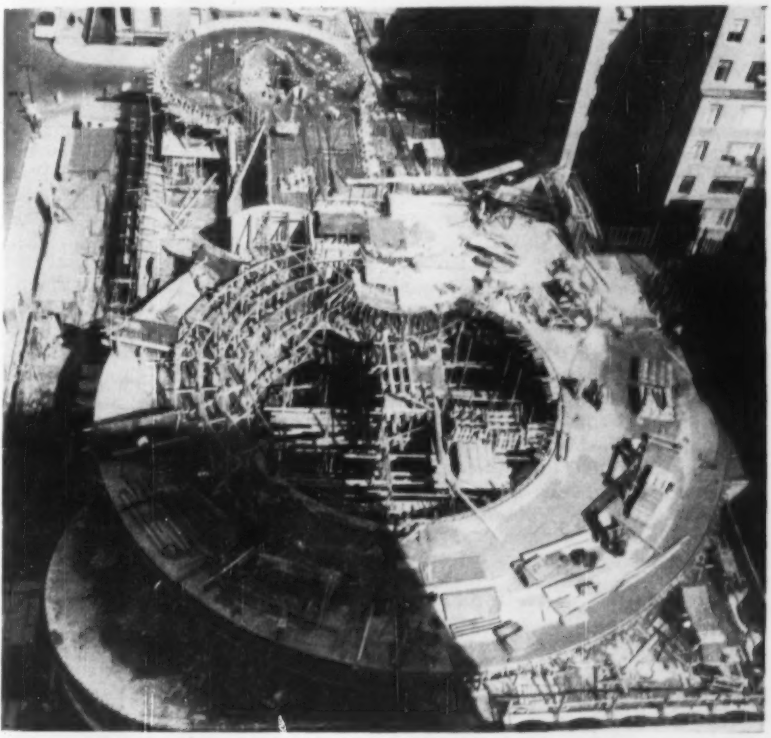
RAMP begins to take shape in the museum wing as the transportation core (rear), composed of two circular-arc concrete walls, rises in the administration wing.

Work of Art

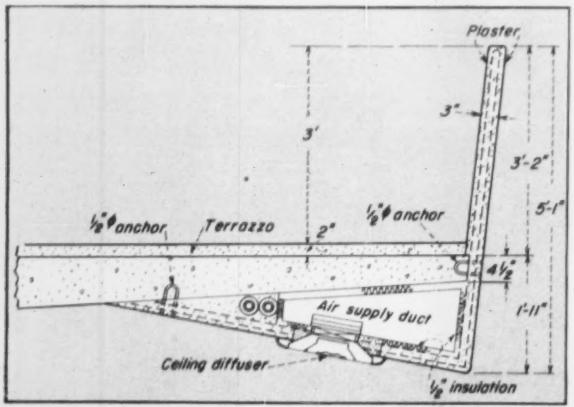
is, it is not so pretentious as his original design for the museum. To overcome objections of the local building department, he was compelled to compromise many of his ideas and to abandon such items as plastic skylights, expanded metal for reinforcing and cork for surfacing the ramp wall. With the aid of Jacob Feld, New York consulting engineer, he was able to modify the structural design to make it acceptable without abandoning the spiral concept (ENR May 10, 1956, p. 27).

• **Connected circles**–The Guggenheim Museum, which will cost about $3 million, occupies a 201x128 ft site between 88th and 89th St. on Fifth Ave. in Manhattan, opposite Central Park. The ground floor, approximately rectangular, covers almost the entire site, but the upper portion consists of two distinct circular wings with lesser coverages–a four-story administration wing and the museum wing, approximately seven stories high. In the basement are a compressor room, work rooms and offices.

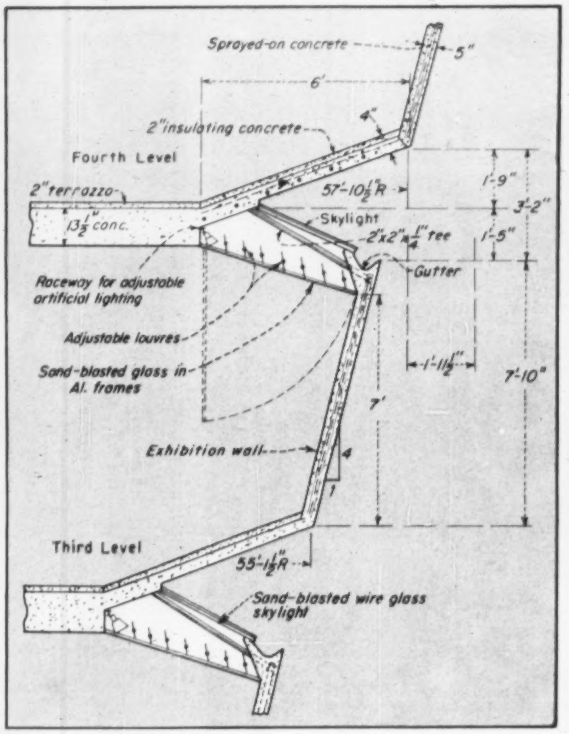
Also in the basement, but under the



FORMWORK for the spiral ramp and thin columns, or webs, supporting it are located by polar coordinates from a center carried up on a wood tower in the inner court.



INNER EDGE of the spiral ramp carries on the underside an air supply duct and ceiling diffuser for distributing conditioned air.



OUTER EDGE of the ramp is connected to exterior wall by inclined slab. Louvered skylight will transmit daylight to displays on the wall.

museum wing, is a large lecture room. This will be daylighted through windows in inverted-arch openings in thick concrete walls.

The four-story administration wing has a diameter of 54 ft above the first floor. Served by its own stairs and elevator, enclosed with curved walls, it provides office and conference space. The director's office on the third floor is topped by a hexagonal glass dome.

In this wing, concrete columns are spaced at 60 deg intervals on a 32 ft dia circle. Like the transportation core, the columns have curved surfaces formed by two circular arcs.

• Compressed spring—The circular museum wing expands outward as it rises. Its outer walls lie on the surface of a cone with apex 180 ft below the main-gallery floor. At ground-floor level, the wall has a 48 ft radius; at the top, 63 ft.

Spiralling up with the walls, the ramp circles around an inner court of decreasing radius and thus widens as it rises. A 3 ft high plaster parapet along the inner edge of the ramp lies on the surface of a cone with apex 270 ft above the main-gallery floor. At first-floor level, the inner radius of the ramp is 32 ft and the outer radius 48 ft; at the fifth level, the inner radius is 25 ft and the outer, 57 ft. A 6 ft wide, steeply inclined slab joins the ramp with the outer wall.

Making a total of six turns, the ramp rises 11 ft with each revolution, starting at main-gallery level. Its slope averages about 4%. Visitors probably will use the ramp mainly for descending; an elevator is available for those who prefer not to walk up. (The elevator, incidentally, is enclosed in a semicircular shaft.)

Pictures will be hung from a molding on a plaster wall furred out from the concrete exterior wall. Daylighting will be provided both through the huge, 12 sided dome above the inner court and through louvered skylights directly above the pictures. Artificial lighting also will be located above the pictures.

With the ramp cantilevered from webs spaced at 30 deg intervals along the outer wall, there are no columns within the main gallery. The structural slab of the ramp, projecting 14 ft from the inner face of the webs, tapers in thickness from 13½ in. to 4½ in. and is topped with a 2 in. terrazzo finish. Embedded in the slab are pipes for radiant heating. And along the inner edge of the ramp is duct space and ceiling diffusers for distributing conditioned air.

While there are no columns above the main-gallery floor, there are a few below it. The gallery floor, consisting of a 12 in. structural slab and 2 in. terrazzo finish, is supported over the lecture room in the basement on the outer walls and six columns on a 64 ft dia ring. These columns are circular, with a 4 ft outer diameter and 2 ft dia hollow core.

Reinforcing for the main-gallery slab, mostly No. 11 bars, was laid out radially and in concentric rings, which were welded together. At the center the converging radial bars were welded to a thick grid of welded bars to distribute the stress.

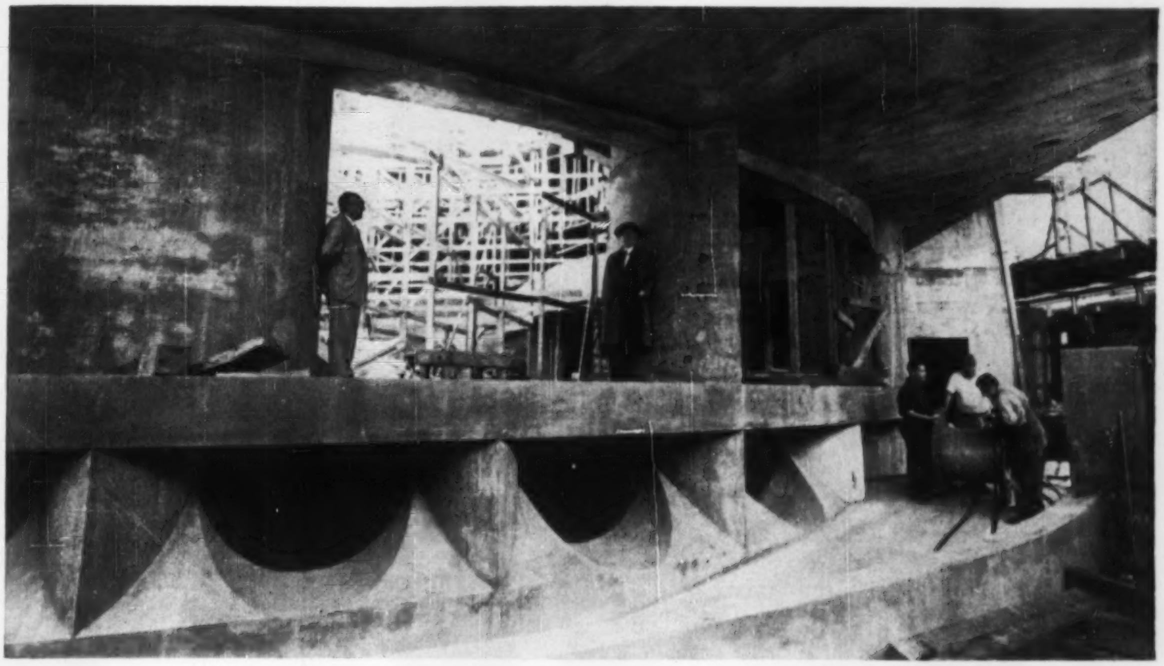
Three types of concrete were used for the museum. In the ramp and floors, the concrete is lightweight, made with expanded-shale aggregate. It has a 28 day strength of 3,500 psi. Ordinary stone concrete of the same strength was used for the interior walls, to get a smooth finish. And the outer walls were constructed by spraying 5 in. of concrete from the inside against curved plywood forms.

The parapet atop the building will be made of precast concrete panels faced with sprayed-on copper.

• Construction controls—Because there are few straight lines in the building and because the walls usually intersect on a skew, the building would have been extremely complicated to erect if Wright had not planned the layout to make it easy for the contractor.

The design is based on an 8 ft rectangular grid, supplemented by polar coordinates in circular areas. Key components are located on grid intersections or along grid lines, or by reference dimensions to the grid given in the plans.

The contractor laid out the grid lines on the ground floor of the building. These enabled him to locate walls, elevator shafts, columns and the centers of polar coordinates for curved



INSPECTING THEIR MASTERPIECE, Frank Lloyd Wright, the architect, and George N. Cohen, the contractor (left), pause at the edge of the circular ground floor. Curved windows below admit light to a basement lecture room.

items, such as the ramp and column rings. He carried important grid lines up the building for referencing at upper levels.

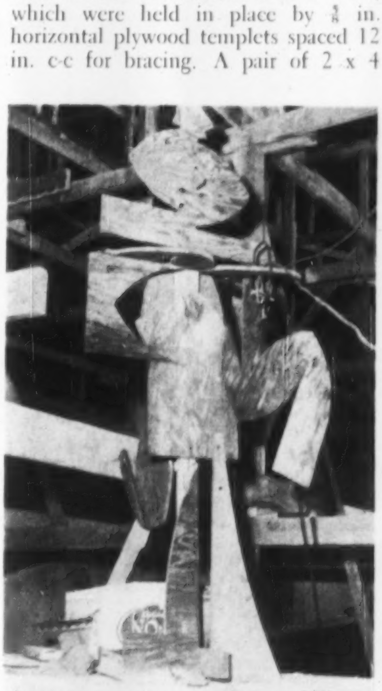
Location of points on the ramp, its supporting webs and the curved outer walls was controlled by polar coordinates with origin at the center of the main-gallery floor. To carry this center to higher levels, the contractor built a wood tower in the middle of the floor and projected the origin to various levels. He then laid out required distances in the proper direction from these points. In this manner, he was able to control dimensions with fine accuracy.

• **Forming the curves**—The contractor also used great care to get smooth, precisely shaped surfaces and sharp intersections in concrete. For forms for curved members, he used ⅛ or 3/16 in. pressed wood where radii were small and plywood up to ⅝ in. thick for larger radii—sometimes soaked in water for easy bending.

The contractor tried to form the 4 ft dia hollow, circular columns with heavy paper tubes but found them unsatisfactory for the outer forms. For one thing, it was difficult to store them on the job and keep them from absorbing moisture, which softened them too much. For another, they proved hard to handle in tight quarters.

Retaining the paper forms for the 2 ft dia hollow cores, the contractor fabricated sets of wood forms for the column exteriors. Each set was 5 ft high, half the column height, for easy handling, and each was composed of two semi-circular forms.

These units were faced with ¼ in. pressed wood, bent to a 2 ft radius. This surface was backed with 1 x 2's, which were held in place by ⅝ in. horizontal plywood templets spaced 12 in. c-c for bracing. A pair of 2 x 4 wales were placed vertically on opposite sides of the templets and held with steel ties.



FIRST EXHIBIT in the museum was sculptured by construction men.

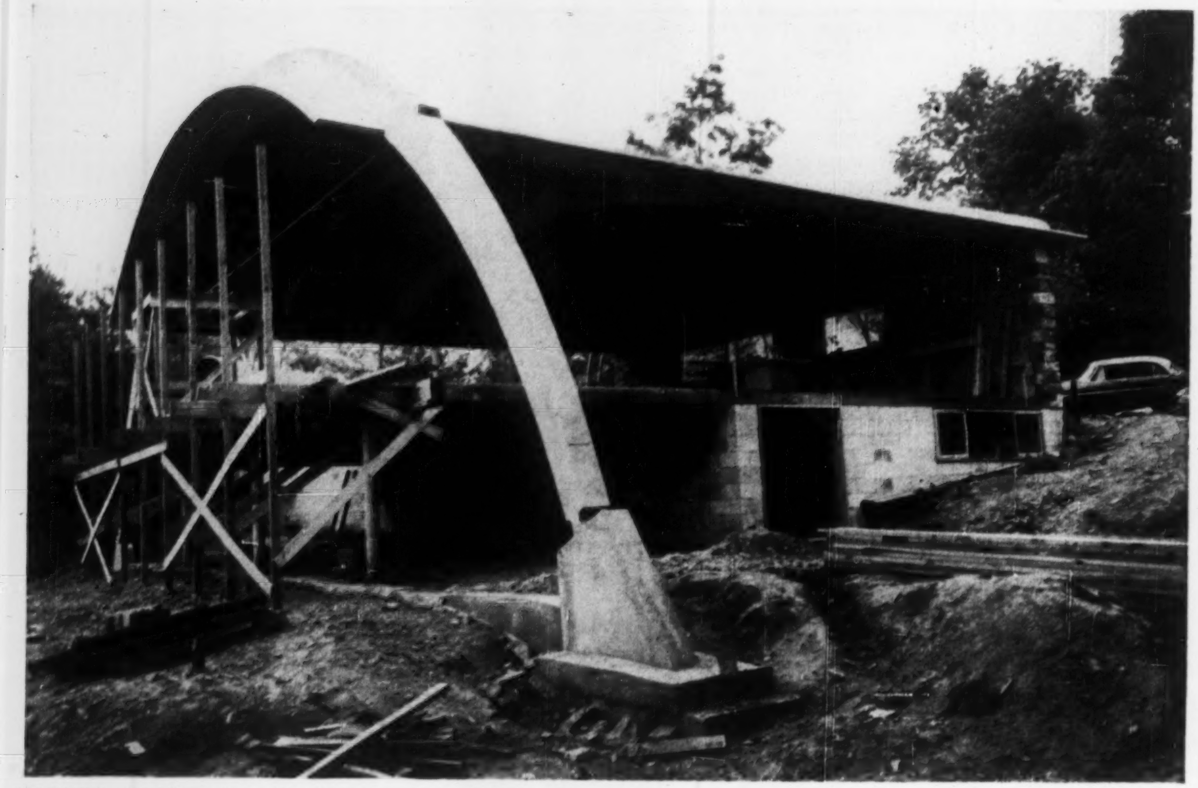
To form a column, a set of forms was assembled and a scab nailed between templets on opposite sides of the form, to hold the units together. In addition, a pair of 2 x 4 vertical wales were set on each side of the templets not already braced with wales and ties were placed between them. Then, a similar assembly was placed on top to bring the form to the full column height.

Since the museum wing was not of ordinary column and slab construction, a special concreting schedule had to be used. For each cycle, the contractor elected to place walls around stairs and elevators first, then concrete the webs and the ramp—in three sections, each about 80 ft long—and finally, to complete other components in the tier.

The control the contractor is exercising over dimensions, surfaces and concreting is paying off. The concrete work appears to be of excellent quality.

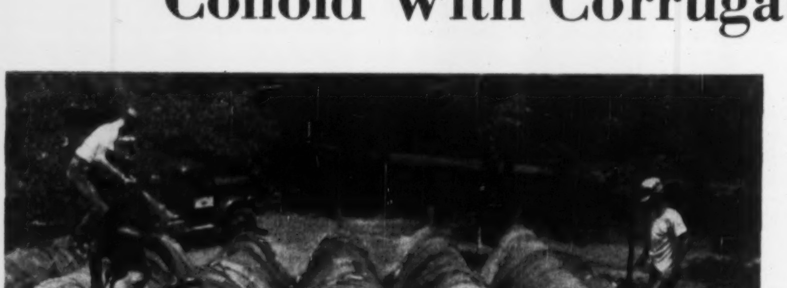
Wright's representative on the job is William H. Short. Mr. Short supplied the air-view pictures of the project for this article.

General contractor is Euclid Contracting Co., New York City. The work is being done under the direction of George N. Cohen, president, assisted by Joseph Neukrug. Charles W. Spero is job superintendent and project manager (see also page 108).



VAULTED FRONT of the thin-shell concrete roof of a new furniture showroom and workshop in New Hope, Pa., is supported by a two-hinged reinforced concrete arch, while . . .

Conoid With Corrugations Makes an



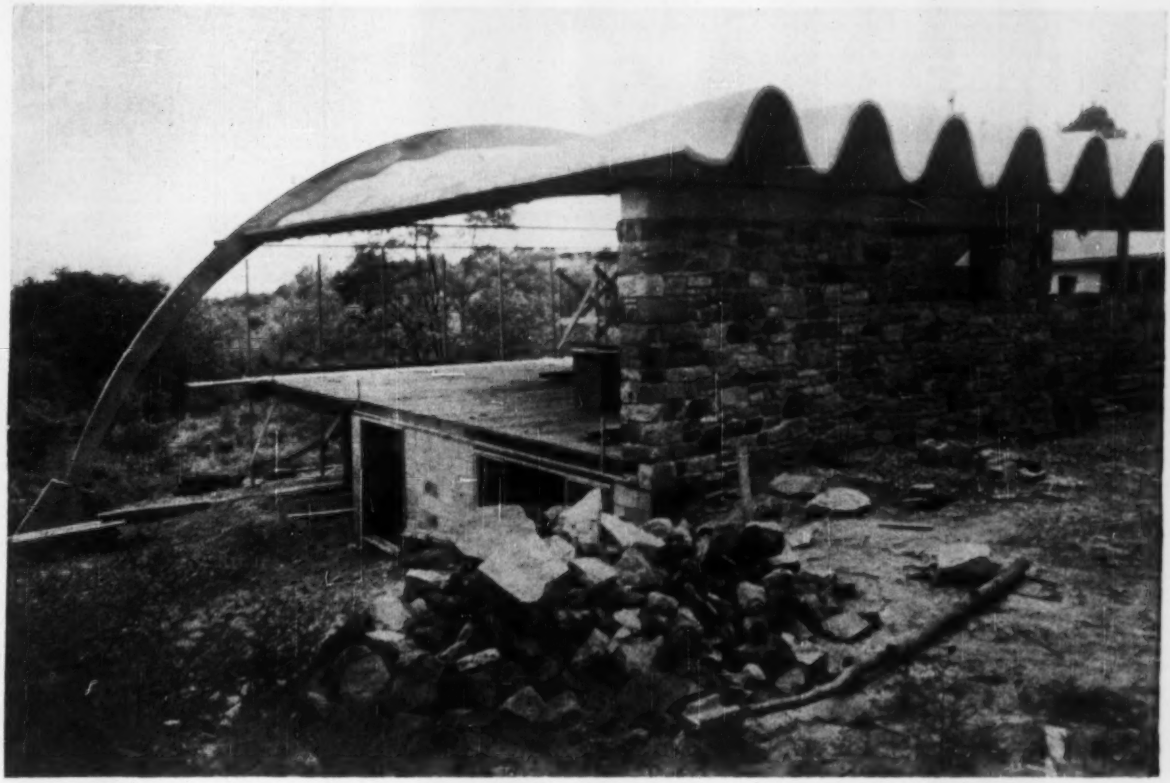
SHELL CONCRETE was placed in one day to a depth of 2½ in. on paper-backed wire mesh. Main reinforcement is No. 6 bars one way, 4 in. c-c.

By Matthys P. Levy
Structural Engineer
Paul Weidlinger
Consulting Engineer
New York, N. Y.

A striking and graceful shape rarely used in buildings in this country greets the visitor to George Nakashima's new furniture workshop and showroom in New Hope, Pa. The 40 x 40 ft building is roofed with a corrugated conoid in thin-shell concrete.

• Geometric form—The conoidal form in this case is a surface described by a series of straight lines, parallel in plan, connecting a horizontal straight line and a vertical arc. The horizontal line is a concrete lintel atop the rear wall of the building. The arc is a reinforced concrete circular arch across the front of the building. The shell is supported by these two elements and overhangs them to form a canopy at front and rear.

Conoidal shells are common in Europe, where they are frequently seen in series covering mill-type buildings.



. . . **UNDULATING BACK** of the shell is a horizontal concrete lintel atop the masonry rear wall of the 40 x 40 ft building. Curvature was accomplished by draping paper-backed wire mesh over straight wood stringers.

Unusual Roof

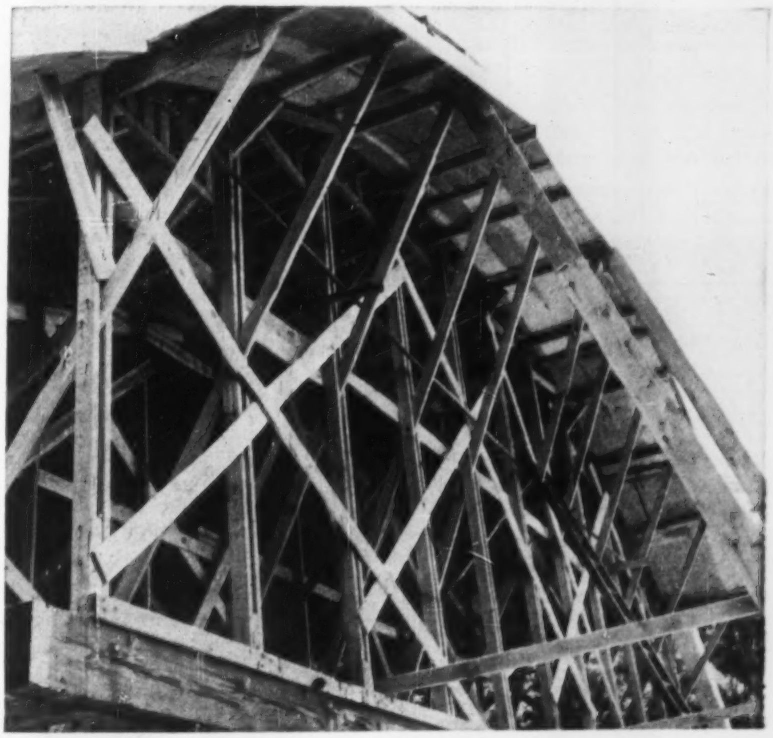
Generally, however, only curved sections are used, the conoidal shape being discontinuous before it flattens completely.

Actually, the basic conoidal surface does not exist in the new roof, for the shell is deeply corrugated longitudinally (front-to-rear). The corrugations have a pitch of 48 in. Their depth is a maximum of 25 in. at the rear wall and diminishes gradually to 3 in. at the front of the building.

The purpose of the corrugations is to deepen the shell cross section near the flattened end of the conoid. Without the undulations, the total depth of the roof structure at the rear wall—where conoidal curvature disappears—would be no more than the thickness of the concrete, 2½ in. in this case.

• **Unusual design**—The roof is supported continuously along the front and rear by the arch and wall, respectively, but not otherwise. It is stiffened 16 ft from the front by a 9 x 12 in. concrete arch rib tied with steel rods.

(*Continued on page 48*)



SHELL FALSEWORK consisted of alternate 2 x 6 and 2 x 4 wood stringers, 12 in. c-c, supported on an 8 x 8 ft grid of posts and beams erected on the main floor of the building.

SURCO
THIN-SET
TILE
REDUCES
SPACE LOSS
AND
COSTS

Tile Thin-set with SURCO Latex Binder gives durability, tenacity, and strength of cement . . . the thinness and easy installation of adhesive type installations. 3/32" - 1/8" tile bed cuts time, labor and material costs. Bed adjusts to variations in thickness. In wall installations the need for lath is eliminated.

Permanent uniform bonds from edge to edge can be obtained over almost any clean surface, including metal and glass. Will not crack or deteriorate even under dampest conditions when used as grout.

SURCO is easy to use. Just add to cement according to directions. Yellow Label provides added waterproofness for pools, bathrooms, etc. Red and Yellow Label offer specific resistance to a variety of chemicals. 1, 5 and 55 gallon containers.

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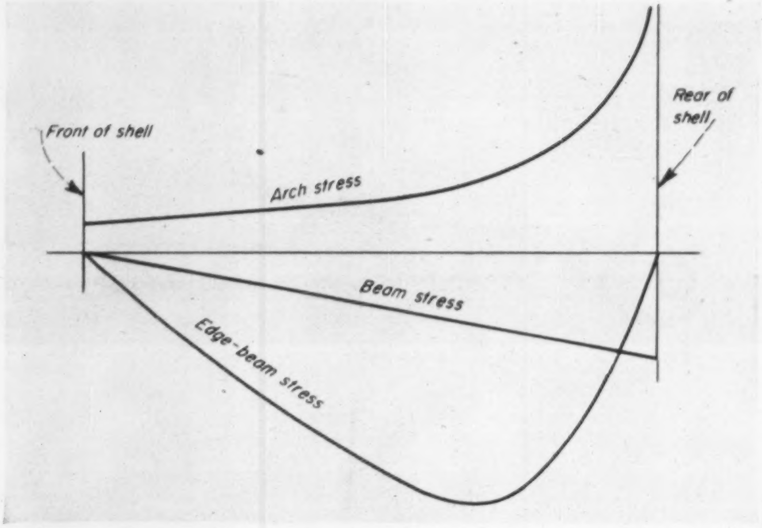


IDEAL STRESS CURVES for a pure conoid show arch stresses rising to impossibly high levels in flat region of shell. Practically, there is no arch action in this area.

The conoid is stressed in two directions. Under externally applied loads, arch action stresses it in a transverse direction and beam action stresses it along the front-to-rear direction. Additional longitudinal stresses result from the beam action necessary to resist the transverse loads imposed by the arch action. In this respect, the shell acts as its own edge beams.

A comparison of arch and beam stresses without considering the corrugations (see plot of stress distribution) shows that in its curved areas the conoid will carry loads by means of membrane stresses, while in the flat region near the rear wall—where arch stresses would have to approach infinity to be adequate—the shell can act only as a plate.

The main supporting arch at the front of the building is two-hinged. It spans 62 ft overall, extending beyond the sides of the building on either side.

• Construction—Located on a sloping site, the building faces downhill. It has a main floor and part basement, the latter above ground at the downhill end.

Of conventional wood-beam-and-joist construction, supported on pipe columns, the main floor was built during early stages of the job, as was the masonry rear wall. The floor was then used as a stage for erection of the roof-shell falsework.

The conoidal shape of the roof presented no particular difficulties in forming, since any line along the shell surface parallel in plan to the sides of the building is straight. (This applies to both a true conoid and the corrugated surface used.) Supported by posts and beams 8 ft c-c, erected on the floor, the main 2 x 6 in. stringers were placed along the ridge and valley lines of the corrugations and intermediate 2 x 4 in. stringers were placed halfway between the 2 x 6's.

Paper-backed wire mesh was draped across the stringers to form the lower surface of the shell and to provide some transverse reinforcement. The main reinforcement, No. 6 bars 4 in. c-c in plan, then was placed longitudinally over the mesh.

The concrete arch was cast first, with dowels left projecting for embedment in the shell. The shell was then concreted in one day. A continuous supply of concrete was maintained by three mixer trucks and placed by crane and bucket. A crew of 20 men spread and troweled the mix, using vibrators at the stiffeners, where concrete depth was greater.

The shell exterior was waterproofed with a sprayed-on cold-glazed finish, which is expected to last the life of the building. The underside of the roof was sprayed with an asbestos insulating compound.

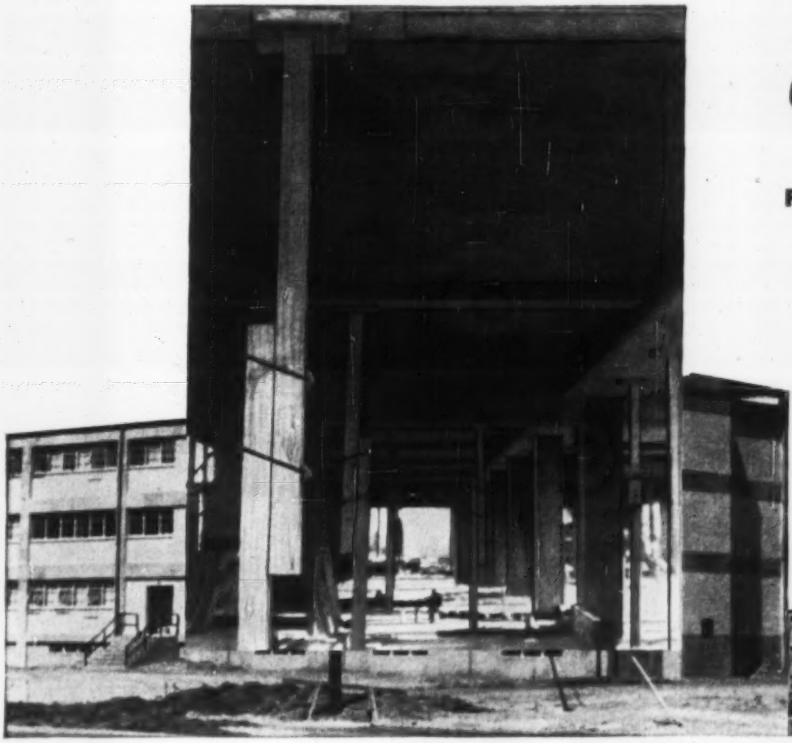
• Costs—Excluding waterproofing and insulation, the shell cost $2.40 per sq ft. Concrete and steel accounted for $1.65 of that figure and formwork for the other $0.75. Formwork cost was kept to the relatively low level by salvage and re-use of 75% of the materials. The cold-glazed roofing job cost $.60 per sq ft. Overall cost of the building is not expected to exceed $10 per sq ft.

The building was designed by Mr. Nakashima, the owner. He and his consultants—Paul Weidlinger, Consulting Engineer, Mario G. Salvadori, Associate, New York City—selected the form of the shell. Mr. Nakashima acted as general contractor, with Joseph E. Hefferman & Sons, Philadelphia, as associate builder.

MASONITE

Concrete Form

PRESDWOOD



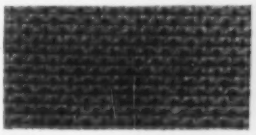
Nine EM Barracks Buildings, El Paso, Texas.
Architects: Davis & Foster, El Paso.
Contractor: Lowell & Ponder.
Concrete Slab Form Work by: The Hausman Steel Company, Toledo, Ohio.

Blemish-free Concrete—time after time!

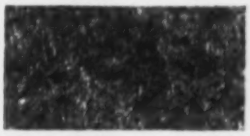
Confronted with a "hurry-up" schedule, the contractor on this job kept on using forms faced with the same Masonite® Concrete Form Presdwood®...and kept on getting the same smooth-surfaced architectural concrete.

They can be used time and again, these smooth, grainless panels. And repeated uses will save you material and forming costs. They won't split, splinter or crack. They can be bent to form arches and columns. The large panels (3/16" and 1/4" thick) are easily cut and worked, using ordinary carpentry tools.

There are two sides to this story



Screen side to concrete. Cuts hand-rubbing time. Provides ideal bond for painting concrete surfaces.



Smooth side to concrete. For blemish-free concrete surfaces. Hand rubbing is virtually eliminated.

® Masonite Corporation—manufacturer of quality panel products

MASONITE® PRODUCTS

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Dept. ENR-12-5, 111 Sutter St., San Francisco 4, Calif.

Please send me a sample of Concrete Form Presdwood and your booklet on cutting costs.

Name..
Firm..
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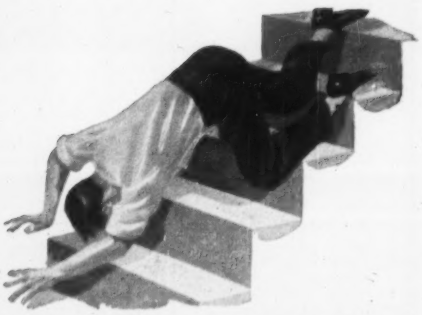
City.......................... *State*..............
Zone.......... *County*..........................

Eliminate slipping accidents!



Relgrit® Abrasive Embedded Grating Treads

Industrial plants throughout the country have found that Relgrit has practically eliminated slipping accidents wherever used.

Relgrit treads are made with an aluminum oxide abrasive, embedded in a "V" groove at the top of the grating bars and nosing. This forms a skid-proof surface that is virtually immune to wear; providing *permanent* protection from slippery surfaces due to water, mud, oil, grease, acids and chemicals. Relgrit is also made for platforms and all other grating areas.

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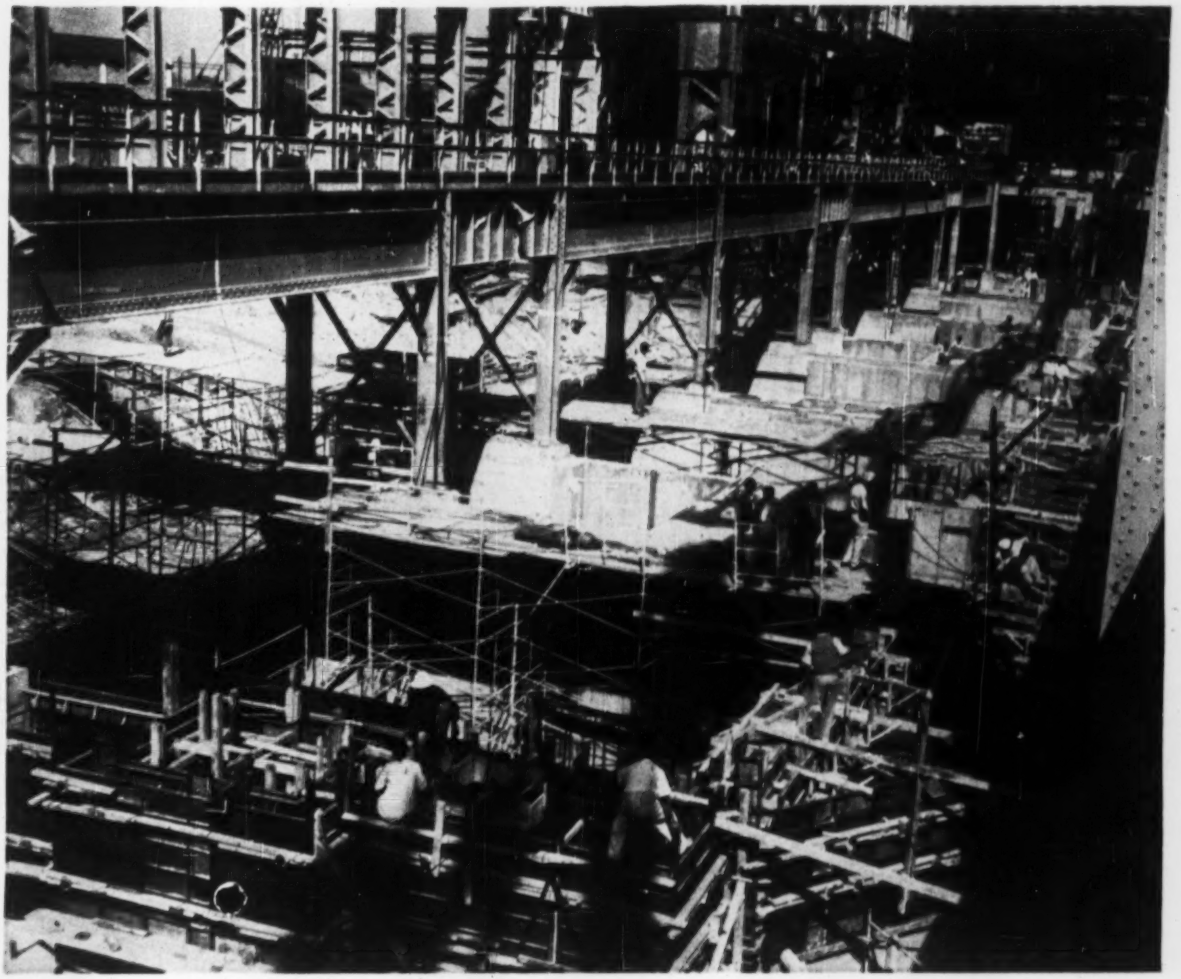
*You can't slip on Relgrit**

*Patent applied for

Reliance Steel Products Company

P. O. Box 510-A, McKeesport (Pittsburgh District), Pa.

Relgrit Abrasive Gratings and Treads • Lightweight Bridge Flooring
Steel, Stainless and Aluminum Grating • Steel Mill Equipment



For this steel mill under construction in India . . .

Prefab Forms Turn the Trick at Tata

The task of placing over 200,000 cu yd of concrete into various structures in temperatures up to 115 deg with a crew unfamiliar with American methods in a land 12,000 miles away, is one of the jobs that Kaiser Engineers Overseas Corp. tackled in constructing an extension to the steel mill of Tata Iron & Steel Co., Ltd., at Jamshedpur, India.

Prefabricated panel forms designed to fit job requirements and shipped from the U. S. were instrumental in solving this problem successfully and in time to permit the remaining parts of the construction schedule to be met. Kaiser's agreement with Tata, made in December, 1955, included design, engineering, procurement and construction, and it specified that the program be completed in 30 months.

The addition to the plant will increase its present annual ingot capacity of 1.3 million tons to a total of 2 million tons. A new sintering plant is being installed to improve the blast furnace burden, and a new 1,650 ton blast furnace is being erected. Two new 200 ton open hearth furnaces are being added (Nos. 6 and 7) and provision has been made for an eighth. New rolling mill buildings will house a 32 in. reversing billet mill, a 9-stand continuous sheet bar and billet mill and a medium and light structure mill.

At the coke plant 26 new ovens are being installed and two existing batteries are being rehabilitated. In conjunction with the coking process, the increased quantity of coke oven gas will be processed through an enlarged benzol and by-products plant.

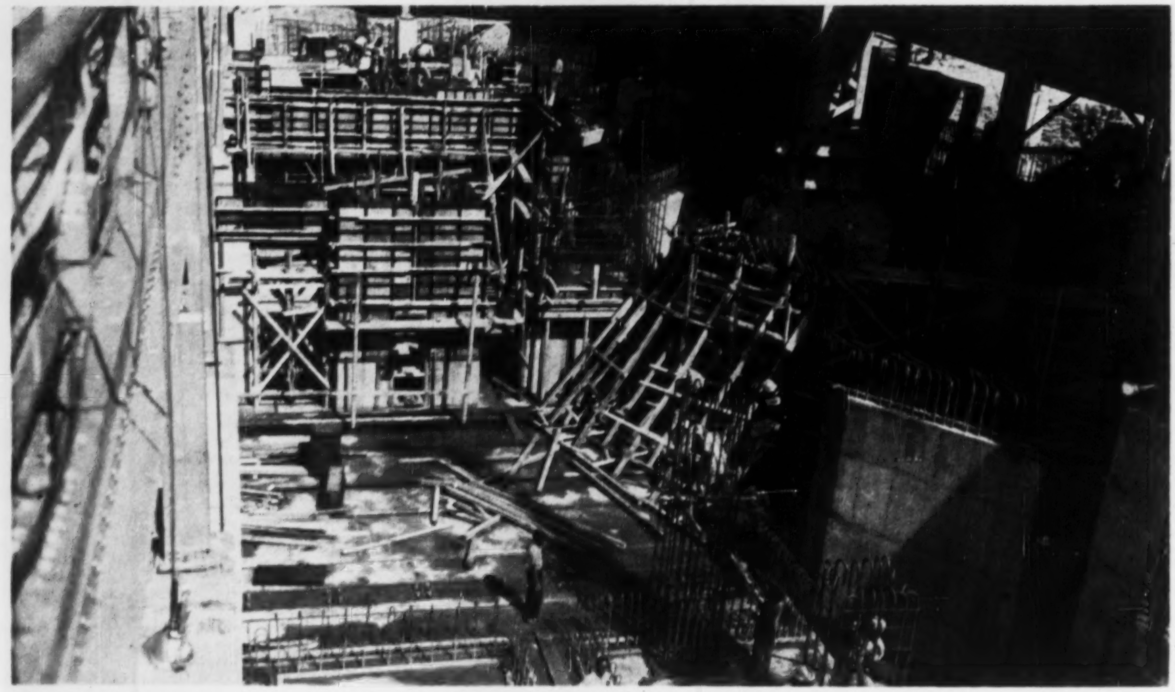
To support these major facilities, two new 100,000 lb per hour boilers are being installed, together with a 125,000 cfm 35 psi turbo blower, ladle repair facilities, ore crushing and screening plant and a new rotary kiln for dolomite production. The contract also includes utilities such as electrical distribution, water, roads and sewers.

The labor force on the job consisted of 12,000 Indians and 100 Americans, of which 900 Indians and four Americans, in charge of supervision and training, were in the carpentry section and concerned with the prefabricated forms.

• **Prefabricated forms**—To assure rapid and economical forming of the concrete portions of the work the contractor considered several methods including conventional job-built wood forms. But he chose a system of prefabricated panel forms as offering both re-usage (important because of a shortage of lumber) and simplicity (important because of the inexperienced labor).

The contractor ordered 80,000 sq ft of prefabricated panel forms, 24 in. wide, in lengths of 3, 4, 5 and 6 ft.

(Continued on page 52)



IN CONGESTED AREAS, most of the concrete was deposited directly into the forms from concrete buggies operating on runways.

INDIAN LABOR FORCE under American supervision combined hand and machine methods to expand Tata's output from 1.3 million to 2 million a year.

They have a plywood face and a steel frame, which cradles and protects the plywood edges. Milled tie slots assured tighter forms. Wall forms up to 48 in. wide were assembled with standard ties, while beyond that thickness ½ in. dia. rods were used.

With this system the contractor was able to form heavy foundation pads, columns up to 28 ft high, and heavy concrete walls, including box-outs for openings, stacks, etc. In addition, the forms were used for circular tanks, cooling towers, retaining walls, abutments, and various other structures that are typical in large steel mill projects.

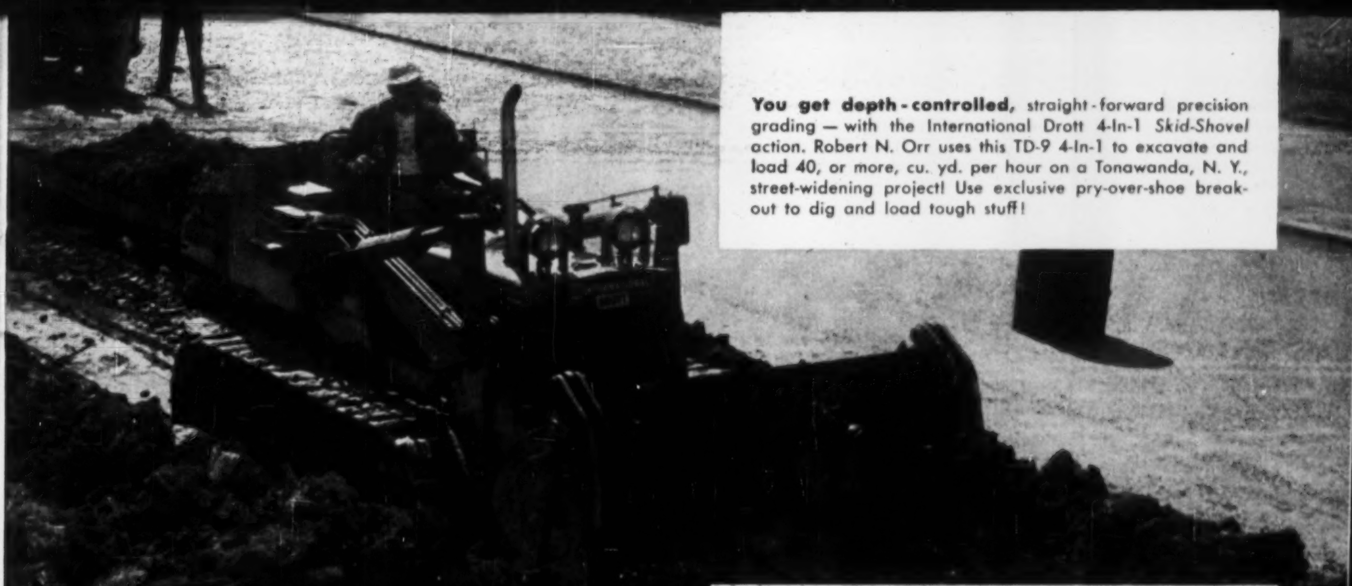
In order to get the concrete completed before the monsoon season, the contractor kept the job moving with two shifts, 16 hours a day, six days a week. All aggregate was produced locally near the job site and transported by truck to the contractor's batching and mixing plant, located at one end of the steel mill property. The concrete was transported by a fleet of nine trucks to the various areas on the job.

About the middle of last April the temperature rost to 115 deg, which necessitated using an additive in the cement to retard the initial setting of the concrete.

The major portion of design and engineering work for this expansion program now is being completed by Kaiser Engineers Division of Henry J. Kaiser Co., Oakland. All of the construction work at the jobsite has been undertaken by Kaiser Engineers Overseas Corp., a subsidiary of Kaiser Engineers.

In addition to construction, substantial portions of engineering and procurement, also are being done at Jamshedpur. As the design drawings involving concrete construction were completed, copies were sent to the engineering department of the San Leandro, Calif., office of the Universal Form Clamp Co., which furnished the panel forms. In addition to providing the contractor with concrete-forming details, which were sent to the job, Robert Koll, field engineer for Universal Form Clamp Co., provided on-the-job technical assistance in form-work design and application.

Procurement and expediting, also under Kaiser Engineers, encompasses the world. With equipment coming into Jamshedpur over the docks of Calcutta from Great Britain, Austria, West Germany, Japan, Italy and the United States, branch offices were established in Germany and Japan as well as at Calcutta to obtain and expedite the flow of these materials.

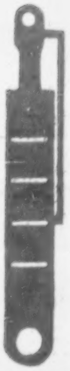

1

You get depth-controlled, straight-forward precision grading — with the International Drott 4-In-1 *Skid-Shovel* action. Robert N. Orr uses this TD-9 4-In-1 to excavate and load 40, or more, cu. yd. per hour on a Tonawanda, N. Y., street-widening project! Use exclusive pry-over-shoe break-out to dig and load tough stuff!

Only 4-in-1 gives you four grading actions *in one machine!*

2

Spreading and leveling fill on Firestone Company property near Buffalo, N. Y.—the operator uses 4-In-1 *bulldozer* action to do fast, close grading. Working depth is regulated by "radius control" of the earth-rolling blade. Contractor: E. R. Granada, Cheektowaga, N. Y.



Get the grading action you need instantly—by merely moving the machine-selector lever on-the-go! Measure the performance protection of exclusive shock-swallowing Hydro-Spring. See what it means to get 4-machine utility for one-machine price! See your International Drott Distributor for a 4-In-1 demonstration!

3

With inch-close grading accuracy this TD-9 4-In-1 puts new home landscaping on a production-line basis — using *"carry-type scraper"* action. You can also strip and spread with this easy-to-control grading and "earth boiling" ability that "single-action" loaders don't have!

Using a back-drag motion of the clam lip, with 4-In-1 *clamshell* action, this operator does a bank-shaping job he could do no other way—except by hand. The exclusive, big-capacity clamshell also gives "stand and fill" action—and self clean-out bottom dumping!

4

International Harvester Company, Chicago 1, Illinois
Drott Manufacturing Corp., Milwaukee 15, Wisconsin

INTERNATIONAL HARVESTER
INTERNATIONAL®
DROTT®

100% INTERNATIONAL®

chosen to highball

To turn miles of prairie and millions of yards of Texas real estate into the Amarillo jet base takes a giant fleet of big-capacity, dirt-delivering equipment!

That's why the contractor, Terra Construction Co., of Great Bend, Kansas, chose International equipment 100% to high-ball this big base!

Texas hardpan boils into "75" Payscraper® bowls with cycle-clipping speed. Highly maneuverable TD-24 tandem pushers not only cut actual loading time, but rely on full-time, exclusive, Planet Power steering to reposition quickly to sharply reduce overall cycle time. And king-sized TD-24 power is instantly adjustable to the load with exclusive on-the-go Hi-Lo shifting!

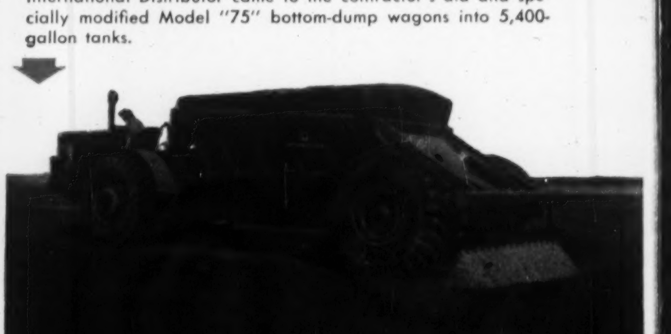
Terra's International "75" Payscraper fleet makes fast loading count with fast get-away—and travel speeds up to 24 mph! High power-to-weight ratio, load-heaping bowl design, exclusive Hydro-Steer—all help give the Payscraper production-boosting operating ease and safety!

Investigate the advantages of powering-up with an all-International matched crawler-scraper fleet. See how International Payscrapers give you top speed, operating ease, and safety. Find out how International TD-24 Planet Power steering gives you pusher performance unmatched by conventionally-steered crawlers. See your International Construction Equipment Distributor for a demonstration!

INTERNATIONAL
INTERNATIONAL
INTERNATIONAL
TERRA
TERRA CONS'T.
11

Part of the Payscraper and TD-24 crawler fleet on the 100% International-equipped Amarillo air base job. Schedule calls for moving 25,000 cu. yd. per double-shift day—placed on the fill in 3-inch lifts.

To deliver the 40,000 gallons of water per hour—required to compact the dry soil to 95% of original density—the International Distributor came to the contractor's aid and specially modified Model "75" bottom-dump wagons into 5,400-gallon tanks.



INTERNATIONAL® CONSTRUCTION EQUIPMENT

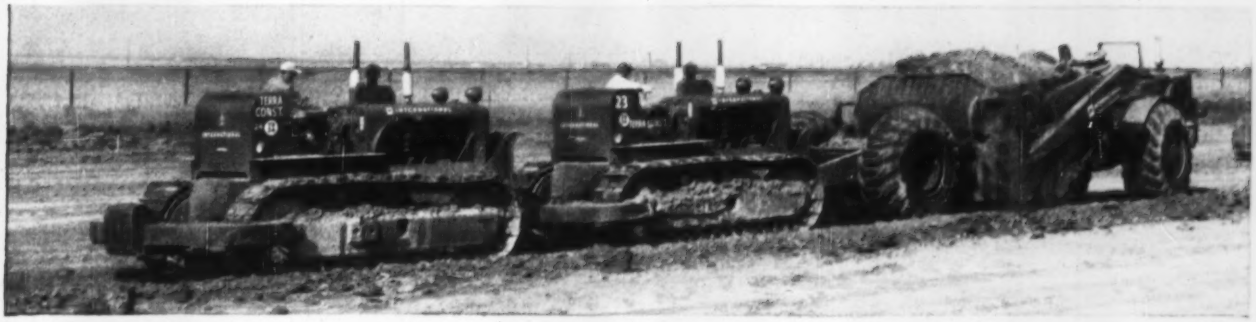
International Harvester Co., 180 N. Michigan Avenue, Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors . . . Self-Propelled Scrapers . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.

FLEET....

"Texas-Sized" jet base!

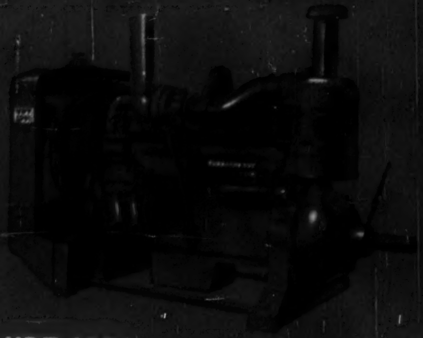
INTERNATIONAL
TERRA CONS


TERRA CONST
23

Tandem TD - 24 pushers profitably overcome the obstacle of loading heat-hardened hard-pan by reducing loading time by 44.4%!

Terra gets an 11.3% production advantage with profit-wise TD-24 tandem push-loading.

	Single TD-24 pusher	Tandem TD-24 pushers
Av. Loading Time:	1 min. 43 sec.	57 sec.
Trips per 60 min. hr.	8.78	9.89
Av. Payload	17.3 cu. yd.	17.3 cu. yd.


TURBOTORQUE

UDT-1091 Turbotorque® Diesel
6-cyl.—5¾ x 7; 1,091 cu. in. displ.; Eng. Max. hp—300 @ 1500 rpm; Power Unit Int. load hp—250 @ 1500 rpm

INTERNATIONAL
UD 1091
DIESEL

UD-1091 6-Cyl. Diesel
5¾ x 7; 1,091 cu. in. displ.; Eng. Max. hp—224 @ 1500 rpm; Power Unit Int. load hp—202 @ 1500 rpm

INTERNATIONAL DIESEL

UD-18A 6-Cyl. Diesel
4¾ x 6½; 691 cu. in. displ.; Eng. Max hp—150 @ 1600 rpm; Power Unit Int. load hp—125 @ 1600 rpm

INTERNATIONAL

UV-549 V-8-Cyl. Carbureted
4½ x 4⁵⁄₁₆; 549 cu. in. displ.; Eng. Max. hp: Gaso.—257 @ 3400 rpm; Power Unit Net hp: Gaso.—209 @ 2600 rpm; LPG—200 @ 2600 rpm

INTERNATIONAL

UV-461 V-8-Cyl. Carbureted
4⅛ x 4⁵⁄₁₆; 461 cu. in. displ.; Eng. Max. hp: Gaso.—226 @ 3600 rpm; Power Unit Net hp: Gaso.—174 @ 2600 rpm; LPG—175 @ 2600 rpm

INTERNATIONAL

UV-401 V-8-Cyl. Carbureted
4⅛ x 3¹¹⁄₁₆; 401 cu. in. displ.; Eng. Max. hp: Gaso.—205 @ 3600 rpm; Power Unit Net hp: Gaso.—160 @ 2800 rpm; LPG—160 @ 2800 rpm

U-281 4-Cyl. Carbureted
4⅛ x 5¼; 281 cu. in. displ.; Power Unit Net hp: Gaso.—67.5 @ 1800 rpm; LPG—73 @ 1800 rpm; Dist.—46.5 @ 1600 rpm

INTERNATIO
U175

U-175 4-Cyl. Carbureted
3⅝ x 4¼; 175 cu. in. displ.; Power Unit Net hp: Gaso.—50 @ 2000 rpm; LPG—51.5 @ 2000 rpm; Dist. 35.4 @ 1800 rpm

INTERNATIONAL
U123

U-123 4-Cyl. Carbureted
3⅛ x 4; 123 cu. in. displ.; Power Unit Net hp: Gaso.—33 @ 2000 rpm; LPG—28 @ 2000 rpm; Dist. 22.8 @ 1800 rpm

INTERNATIONAL

UC-60 4-Cyl. Carbureted
[illegible]; 60 cu. in. displ.; Power Unit Net hp. Gaso.—16.5 @ 2500 rpm; Nat. Gas—13.5 @ 2500 rpm

INTERNATIONAL
U 1091

U-1091 6-Cyl. Carbureted
5¾ x 7; 1,091 cu. in. displ.; Power Unit Net hp: Propane—255 @ 1600 rpm; Nat. Gas—232 @ 1600 rpm

INTERNATIONAL
U501

U-501 6-Cyl. Carbureted
4½ x 5¼; 501 cu. in. displ.; Basic Eng. Max. hp: Gaso.—212 @ 3000 rpm; Power Unit Net hp: Gaso.—133 @ 2200 rpm; LPG—128 @ 2200 rpm

INTERNATIONAL
U450

U-450 6-Cyl. Carbureted
4⅜ x 5; 450 cu. in. displ.; Basic Eng. Max. hp: Gaso.—182 @ 3000 rpm; Power Unit Net hp: Gaso.—126 @ 2200 rpm; LPG 124 @ 2200 rpm

UD-525 6-Cyl. Diesel

4⅝ x 5¼; 525 cu. in. displ.; Eng. Max. hp—137 @ 2000 rpm; Power Unit Int. load hp—115 @ 1800 rpm

INTERNATIONAL DIESEL

UD-14A 4-Cyl. Diesel

4¾ x 6½; 461 cu. in. displ.; Eng. Max. hp—105 @ 1800 rpm; Power Unit Int. load hp—76 @ 1400 rpm

UD-350 4-Cyl. Diesel

4½ x 5½; 350 cu. in. displ.; Eng. Max. hp—92 @ 2000 rpm; Power Unit Int. load hp—75 @ 1800 rpm

UD-281 4-Cyl. Diesel

4⅛ x 5¼; 281 cu. in. displ.; Eng. Max hp—68 @ 1800 rpm; Power Unit Int. load hp—60 @ 1800 rpm

21 production boosters that give you a full measure of dependable power!

Here is the complete expanded line of 21 International power units that boost your production, not your power costs. Whether diesel or carbureted—V-8, 6 or 4-cylinders—each gives you a full measure of dependable power in your new or old machines.

All 21 Internationals shown here are available in varying stages from a basic engine to a complete power unit.

The 14 International carbureted power units, ranging from 16 to over 200 net hp, can be equipped to burn either of two or more fuels—the one most economical for your use. And there's no guesswork about power ratings of an International on the specified fuel. Carburetion equipment is factory tested and installed.

Seven International diesels, rated from 60 to 250 net hp (300 max. hp), are outstanding for easy, all-weather starting and low consumption of No. 2 Diesel fuel. Like the carbureted models, these rugged 4-cycle units are fully sealed against life-robbing dirt and dust.

See your International Power Unit Distributor or Dealer soon. He will show you a power-packed International that will make more money for you.

International® Construction Equipment

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180 N. Michigan Ave., Chicago 1, Illinois

A COMPLETE POWER PACKAGE: Crawler and Wheel Tractors . . . Self-Propelled Scrapers . . . Crawler and Rubber-Tired Loaders . . . Off-Highway Haulers . . . Diesel and Carbureted Engines . . . Motor Trucks . . . Farm Tractors and Equipment.

INTERNATIONAL
U372

U-372 8-Cyl. Carbureted

[illegible]; 372 cu. in. displ.; Basic Eng. Max. hp: Gaso.—165 @ 3200 rpm; Power Unit Net hp: Gaso.—104 @ 2200 rpm; LPG—98 @ 2200 rpm

INTERNATIONAL
U308

U-308 8-Cyl. Carbureted

[illegible]; 308 cu. in. displ.; Basic Eng. Max. hp: Gaso.—154 @ 3600 rpm; Power Unit Net hp: Gaso.—87.5 @ 2400 rpm; LPG—91.2 @ 2400 rpm

INTERNATIONAL
U264-6

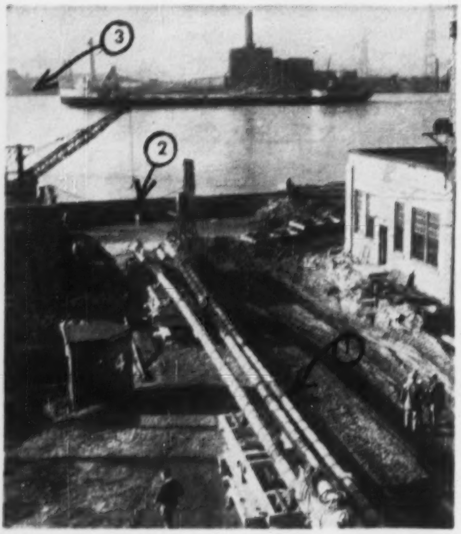
U-264-6 6-Cyl. Carbureted

[illegible]; 264 cu. in. displ.; Basic Eng. Max. hp: Gaso.—[illegible] @ 3700 rpm; Power Unit Net hp: Gaso.—78 @ 2400 rpm; LPG—80.8 @ 2400 rpm

INTERNATIONAL
U220

U-220 8-Cyl. Carbureted

[illegible]; 220 cu. in. displ.; Basic Eng. Max. hp: Gaso.—172 @ 3700 rpm; Power Unit Net hp: Gaso.—68 @ 2400 rpm; LPG 68 @ 2400 rpm



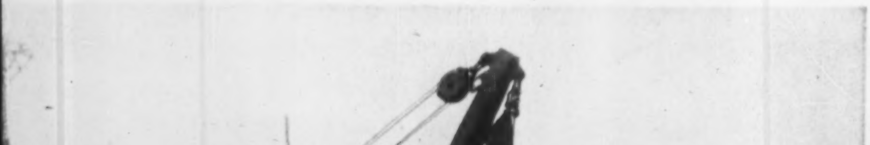
AN INTERNATIONAL PIPELINE across a 2,400 ft channel between Windsor, Ont. and Detroit, Mich. had to be put down—without interrupting ship navigation. It will feed brine from a Canadian salt company to a Detroit chemical plant. Here's how it was done: **(1)** Two pipelines, each to be made up of three 800 ft sections of heavy 10 in. dia pipe **(2)** were threaded through a hole in a seawall and **(3)** dragged across the river bottom to the other shore with a winch.

Brine Pipeline

Two 2,400 ft pipelines had to be put across a busy shipping channel in a day apiece. Collins Construction Co. agreed to do the job for Canadian Brine, Ltd. of Windsor, Ont.

When the contractor moved onto the job site on the Canadian shore, he

DIVER goes down in shallow backwash to align leading dolly with hole punched in



LAYING PIPE sections on dollies is fast, simple operation requiring only two light tractors. Rubber tire rollers protect pipe.

Press Picture Serv.

WELDING JOINT takes special clamp plus added weight of men to give it alignment.

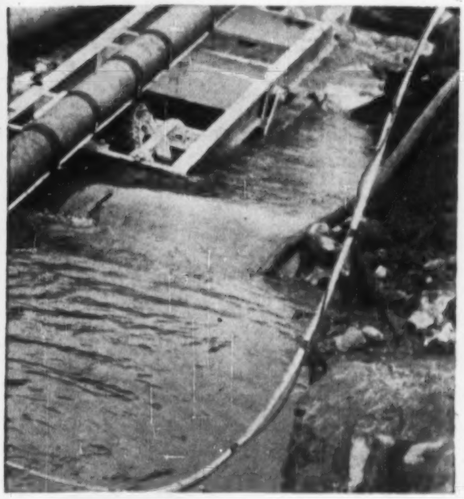
Crosses Detroit River

drove a hole in the seawall through which the pipes would pass on their trip across the river.

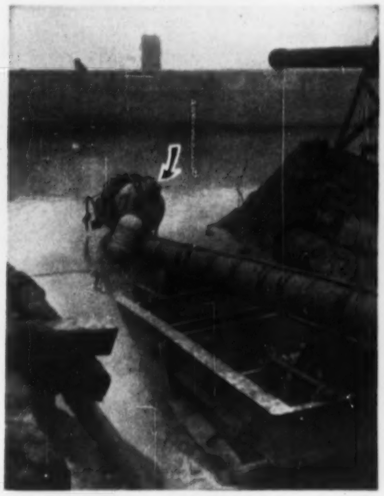
Then the leading 800 ft pipe section was placed on dollies and hauled through the hole and into the channel by means of a winch on the opposite shore. Another section was then hoisted in place, joined to the first pipe, and the winch moved once more. Each welding operation, including cooling and x-ray inspection took three hours. In spite of these, 10 hours were needed to make the crossing with each pipeline.

To give the proper amount of buoyancy to the heavy pipe, Collins used a patented flotation device. The gain in buoyancy eliminated much of the heavy friction drag and made the hauling operation feasible.

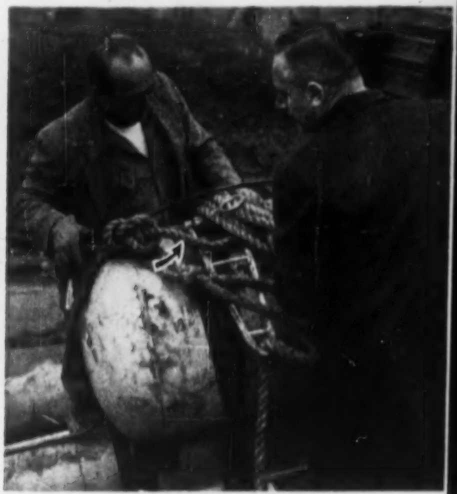
After the pipelines were in place a hydraulic jet scooped out a 10 ft trench beneath the pipeline, which was permitted to settle. By similar jetting upstream the line was then safely buried.



shore retaining wall. Rollers on dolly feed pipe into position.



FLOTATION APPARATUS (arrow) gives pipe proper buoyancy to reduce the drag.



RELEASE MECHANISM (arrow) releases flotation bottle when pulled from surface.

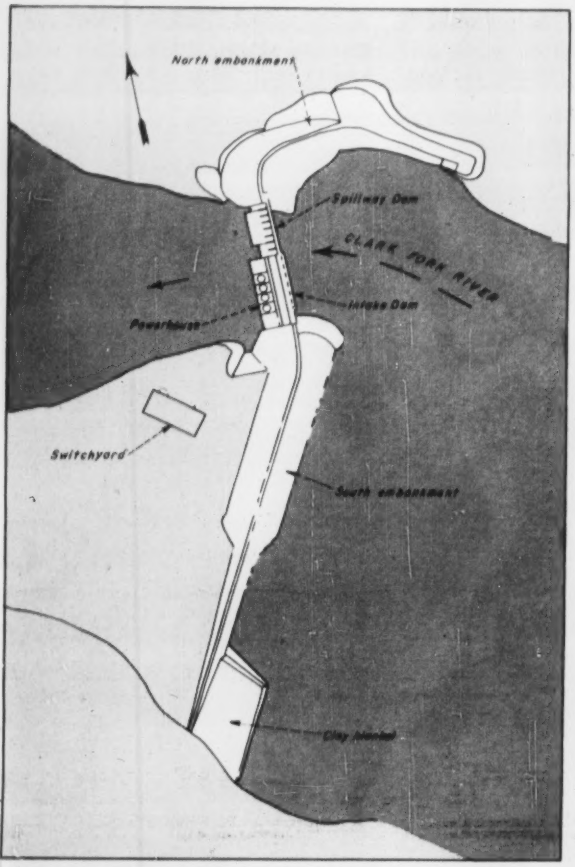
DETROIT SIDE uses winch to haul pipeline across river. A boat with detecting apparatus enables contractor to follow progress of the pipe.

JOURNEY'S END for pipeline. A jet will now dig a trench underneath the pipeline.

Noxon Rapids:

Small dam, causing big problems of relocation upstream, will be among first with T-1 steel scroll cases. Four-year construction schedule permits unhurried building and smooth river handling operations.

CRANE PLACES FIRST PENSTOCK in Noxon Rapids Powerhouse. Concreting the powerhouse was the major point of construction emphasis during the current season.


North embankment
Spillway Dam
CLARK FORK RIVER
Intake Dam
Powerhouse
Switchyard
South embankment
Clay blanket

DAM HAS LONG EARTH SECTIONS with concrete spillway and powerhouse taking about one-fifth of its 5,930 ft length.

RIVER FLOWS THROUGH SLUICES now with normal river flow. The 1958 high water flow will pass over this low section.

Power Dam Rises in Montana

Noxon Rapids Dam on the Clark Fork River in western Montana will have four 100,000 kw generators on the line in 1960 after a four year construction period. The structure, a central concrete section (including spillway and powerhouse) and earthfill wing sections, is a project of Washington Water Power Co.

These elements of the project stand out:

- Cost of relocations—highways, rails and transmission lines—from the reservoir area is about the same as the actual construction cost of the dam and powerhouse (see p. 66).
- High yield strength, low-carbon T-1 steel is being used for turbine scroll cases, including field welding (see box on p. 62).
- A deep gorge in the rock foundation for the north earthfill embankment is plugged with a grout curtain topped by a sheetpile cutoff wall.

The $87 million Noxon Rapids Dam is located at the headwaters of Cabinet Gorge reservoir, some 55 miles southeast of Sandpoint, Idaho. It includes a 660 ft long, 190 ft high concrete spillway dam (height is foundation to deck level except where one deep pot hole puts maximum height at 265 ft).

The powerhouse intake dam is 470 ft long with the powerhouse being built for five 100,000 kw units—initial installation is four units.

The north embankment is 1,800 ft long while the south embankment is 3,000 ft long. Fill totals nearly 4 million cu yd.

The area is the site of a prehistoric lake that left the valley partly covered with a clay deposit which improves the watertightness of the reservoir. Occasional rocky ridges penetrate up through the clay and gravel layers. The concrete structures and much of the north embankment are being built on one of these rock ridges. The south embankment is based on a thick layer of clay formed by the ancient lake bottom.

The dam will back up water for 38 miles in a reservoir of 380,000 acre-ft capacity. Of this amount, 80,000 acre-ft is normal usable controlled storage, with 10 ft drawdown. And, if necessary, additional drawdown is possible.

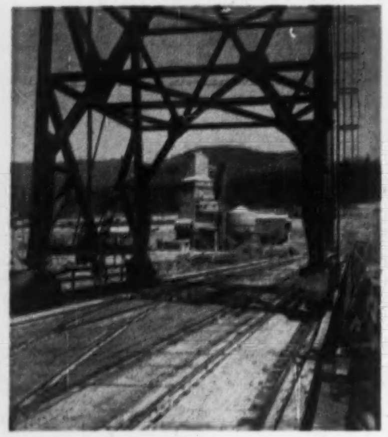
Dam crest is at El 2340 with maximum high water at El 2331. Normal gross operating head is 154 ft. The 100,000 kw generators will be driven by 137,000 hp Francis turbines—ranking among the largest such turbines ever built.

• **Construction schedule**—The four year construction period is geared for first power delivery in the fall of 1959. New power will be needed at that time due to load growth on the WWPCo system together with greater preference customer demand on federal power resources in the Pacific Northwest.

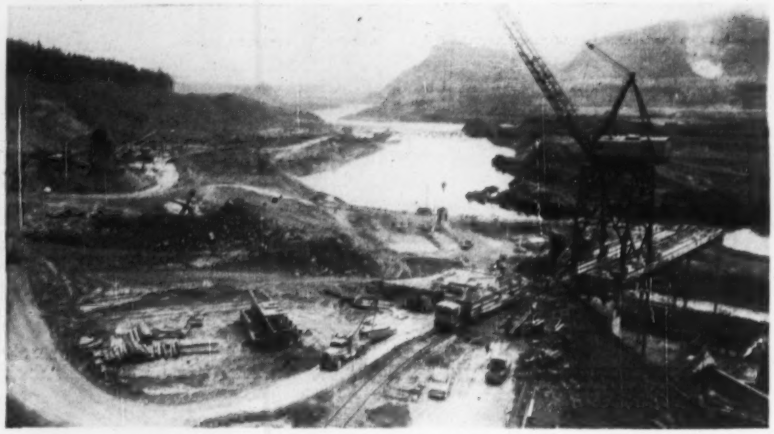
The four year schedule is in sharp contrast to construction of Cabinet Gorge Dam that was completed in 1952 just downstream. At that time, additional power was needed badly, and the project construction was compressed into 1½ years. This was accomplished by turning the complete low

DRAGLINE EXCAVATES ROCK from powerhouse foundation. This was preliminary step to large scale powerhouse concreting.

PUMPS REMOVE SEEPAGE through the rockfill cofferdams. Maximum pumping capacity planned is 160,000 gpm.



BATCH PLANT feeds concrete to crane for placing in spillway and powerhouse.



CONCRETE IS DELIVERED to cranes in 4 cu yd buckets on flatcars hauled by 25 ton diesel powered engines. Job's automatic concrete batching plant has two 4 cu yd mixers.

water flow of the river through a diversion tunnel and accomplishing most of the concrete work during one low water season.

At present, however, power demand is not as acute. Thus, the Noxon Rapids schedule can be more orderly. River diversion is accomplished by a two-stage cofferdam system. This permits concreting the major portions of the spillway section in one low-water season (1956-57) and the major portions of the powerhouse in a second low-water season (1957-58).

On this section of the Clark Fork River, a low-water season extends from about mid-July until mid-April. Low flows are as little as 10,000 cfs with normal low water being less than the 30,000 cfs. High water flows, on the other hand, average about 90,000 cfs with maximum known flood being 194,000 cfs.

First construction step was throwing a cofferdam around the spillway area on the north side of the river at the beginning of the 1956-57 low-water season. During that first year, the spillway was constructed except for four middle blocks left at El 2195. Eight sluiceways below this elevation pierce the concrete mass to handle low-water flows during construction. While the spillway was thus being constructed, the river was flowing along the south side of its bed where the powerhouse will be located.

Just before the 1957 high water flow, the rock cofferdam was breached and water was permitted to flow through the spillway openings as well as around the south end of the spillway.

The most critical construction phase is now under way. A pair of cofferdams—one upstream and one downstream—were thrown across the river between the spillway and the south bank as soon as high water flow began to recede. Now the contractor's most urgent task is to get the powerhouse site excavated to bedrock and build the powerhouse high enough to (El 2240 by Apr. 15) during this current construction season to prevent its overtopping during next year's high-water flow. With this accomplished, the entire 1958 high water flow will pass through the eight sluiceways and over the low spillway blocks.

In the 1958-59 low-water season the spillway will be completed to full height with the sluiceways again taking the low-water flow. In April of 1959, it is planned to drop gates and plug the sluiceways and thus bring the reservoir up to spillway level for first generation in September of that year.

T-1 Steel Used for Turbine Scroll Cases

The relatively new T-1 steel is being used for the Noxon Rapids turbine scroll cases—one of the first uses of this material on a hydroelectric project. Only similar application is on scroll cases for Idaho Power's Brownlee Dam on the Snake River.

T-1 steel has a high yield strength—90,000 psi—and a low carbon content which improves its weldability. Due to the higher strength, maximum thickness of the Noxon Rapids turbine scroll cases is reduced from 1⅝ in. for mild steel to 1 in. for T-1 steel. This results in several savings; for example, less thickness need be welded in the field and cost of freight and other handling is reduced. Of course, the T-1 steel costs more per pound. And there are special problems in welding the T-1 steel to the low-carbon steel penstock. But the over-al effect of using the new highstrength steel is believed to be one of economy.

All steel in the casing is bent cold in the shop. To assure accurate alignment, field welding sequence is important. Longitudinal joints in two adjacent courses are welded first and then the connecting girth joint is welded.

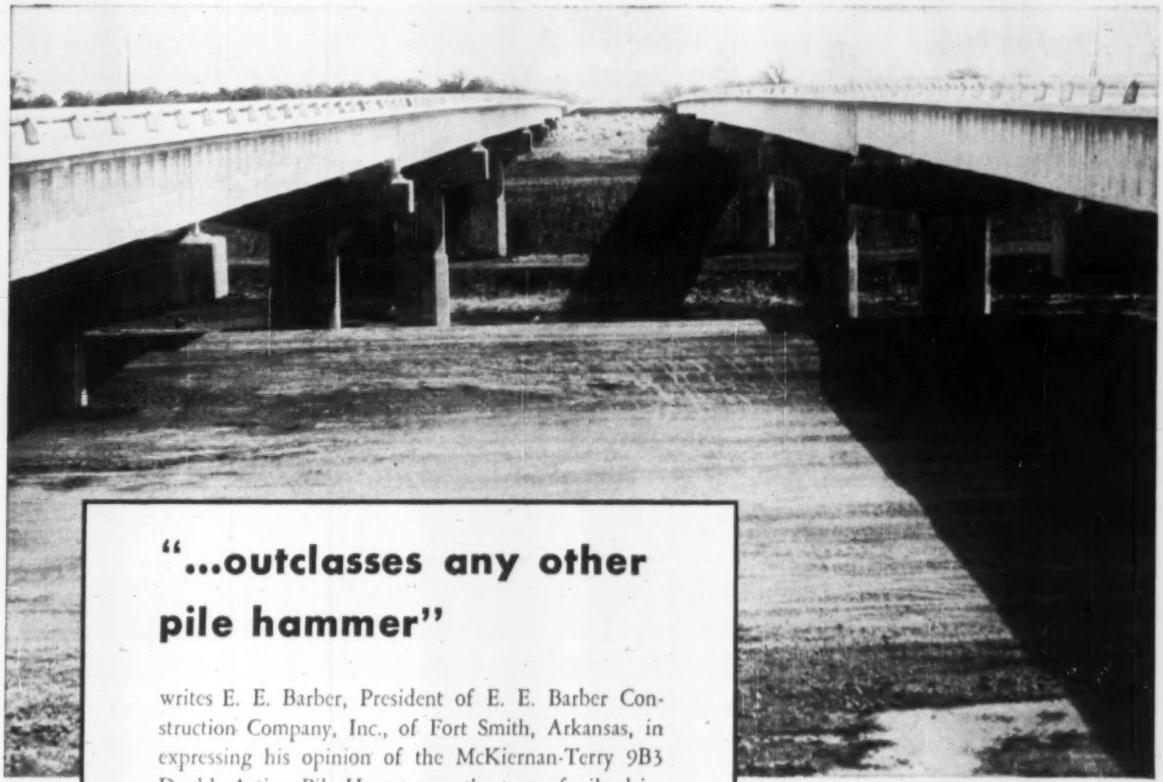
The cofferdams protecting the powerhouse excavation total about 75,000 cu yd of fill for the upstream unit and 60,000 cu yd for the downstream unit. The dikes were made by dumping large rock from a bridge and filling behind with smaller material. Such cofferdams are by no means watertight. The construction is protected by a substantial pumping installation that will total 160,000 gpm capacity when in full operation. Biggest pump has a 400 hp motor and is capable of moving 26,000 gpm at 66 ft head.

• Concrete from trestle—Concreting and other construction operations are being handled from a 938 ft long construction trestle that has a maximum height of 105 ft. The trestle was designed by Morrison-Knudsen engineers and constructed part way out to handle spillway work during the first season.

Mounted on the trestle are two Whirley cranes with 155 ft booms that will reach all concrete pours. The Whirleys are capable of 11 ton lifts at flat boom and 35 ton lifts when at a 75 deg angle.

The concrete batch plant is located about 500 ft from the trestle. It is an automatic plant with two 4 cu yd mixers. Concrete is moved in 4 cu yd buckets from batch plant out onto the trestle by flatcars hauled by diesel-powered donkeys. Mass concrete is required at 2,000 psi 28 day strength and face concrete must have 3,000 psi 28 day strength.

Aggregate is produced under subcontract from riverbed deposits. It is hauled to storage piles near the concrete plant. As the riverbed deposits and aggregate plant site will be inun-



Twin bridge over the Verdigris River on the Oklahoma Northeastern Turnpike for which E. E. Barber Construction Company used a McKiernan-Terry 9B3 Pile Hammer. Photo by courtesy of Oklahoma Turnpike Authority.

"...outclasses any other pile hammer"

writes E. E. Barber, President of E. E. Barber Construction Company, Inc., of Fort Smith, Arkansas, in expressing his opinion of the McKiernan-Terry 9B3 Double-Acting Pile Hammer on the type of pile driving for which it is intended.

Mr. Barber further writes:

"We have been using McKiernan-Terry pile-driving equipment for the last 35 to 40 years . . . We use the 9B3 exclusively for steel sheet piling and 10" H-beam piling and all wood piling. The 120 to 140 blows per minute that you get from a 9B3 hammer in sandy formation will drive a pile faster and further . . . The 9B3 also has an advantage in head room . . . I bought a 9B2 McKiernan-Terry Hammer in 1929 and used that hammer until the fall of 1955 before its efficiency was gone."

The experience of this representative contractor is being duplicated by contractors all over the country. You, too, can be sure of the same speedy pile-driving work and long pile-hammer service by using McKiernan-Terry hammers. Write for bulletin.

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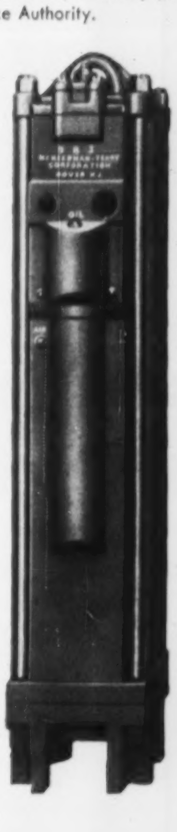
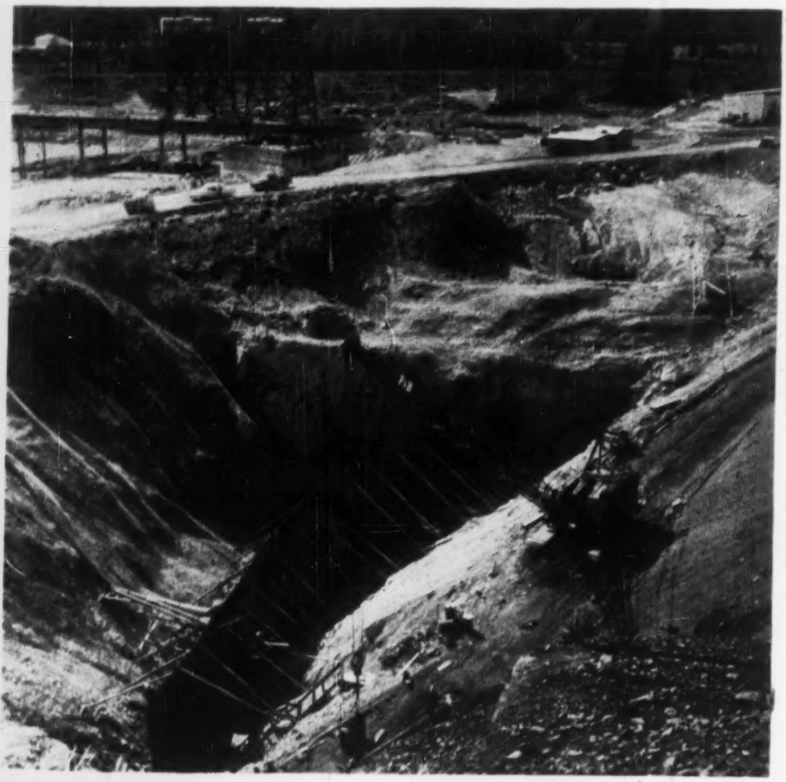


MK401

AGGREGATE IS STOCK PILED near batch plant. Aggregate plant will be removed after next flood season with enough rock stockpiled for completing the job.



SHEETPILE WALL provides cutoff in deep hole on north earthfill. Cutoff wall tops thick grout curtain and will be encased in clay fill.

dated, storage capacity for 80,000 cu yd of concrete has been provided. Between the aggregate stockpiles and the batch plant is a washing and re-screen plant. This cleans off any dirt or dust that may have accumulated on the rock while stockpiled and assures accurate sizing before batching.

Because the concrete quantities are not large there is little need for special concrete-cooling measures. During the summer months—June 1 to Sept. 30—concrete placing is restricted to the cool hours of the day. And a minimum of 96 hours is required between placing of successive layers. Normal lifts are limited to 5 ft with 72 hours minimum time between adjacent lifts.

Sprinkling of the aggregate stockpile provides all the cooling that is necessary. And after initial set of the concrete, water is left standing on top of the mass block.

Concrete will be placed up to December when there will be a two or three month shutdown during the worst winter weather. Largest powerhouse quantities were scheduled for September.

• **Earthfill wing dams**—The two wing dams are substantially different in nature. The north embankment is curved to follow a rock ridge. The south embankment is relatively straight.

The north embankment is founded on rock except for a grout curtain and sheet pile cutoff wall installation in a deep prehistoric channel that cuts through the rock. The south embankment is founded on a thick layer of clay deposited by the prehistoric lake.

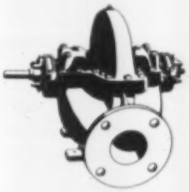
Shell material for the north embankment to a large extent comes from stockpile resulting from excavation to strip the embankment area to bedrock. On the other hand, shell material for the south embankment comes from a borrow area located only 300 ft from the upper end of the embankment where most haul is downhill. And this material can, by-and-large, be handled by carrying scrapers.

Core material for both embankments comes from the same borrow pit located on the north side of the river. This is a heavy clay that when wet becomes impossible to handle. Thus, core placing is restricted to three summer months. And even then, large areas must be open to permit drying out enough for picking up by carrying scrapers assisted by tractor pushers. It is so stiff even at this stage that self-powered scrapers having engines for both front and rear wheels are not able to pick up a load. And the area was just out of the question for elevating loaders. Thus, the clay borrow area is 45 acres—large enough to permit surface drying. It contains almost a million cubic yards of material, although only about half that amount is needed in the core.

Normal section for the earthfill embankments includes a core of compacted clay with a 15 ft top width and 1 on 4 sides slopes (1 horizontal to 4 vertical). Both upstream and downstream of the clay core are sand filter zones that also have a 15 ft top width. Outside slopes of the filter zones are 1 on 3. The cores and filters are protected by a sand-and-gravel shell with relatively flat outside slopes—3 on 1. Upstream slopes include a 3-ft thickness of riprap on a 12 in. thickness of selected pit-run gravel.

Location of the north embankment was determined after extensive preliminary borings. More than 200 holes were drilled to fix the location of the rock ridge. The drilling disclosed a deep river-excavated channel through the rock that went some 150 ft below ground level. In this area an 8 ft wide curtain wall of grout was placed to a

Look! NO STUFFING BOXES



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60 ft depth. This was topped by a 24 ft high steel sheet pile wall with the joints sealed with a rubber compound.

• **People**—Noxon Rapids Dam is a project of Washington Water Power Co. under the supervision of K. O. Strenge, chief civil engineer.

The project is being designed and construction is being managed and supervised by Ebasco Services, Inc. Project engineer in charge of design in Ebasco's New York City office is Robert A. Sutherland and project manager for Ebasco at the site is F. L. Weiss.

Morrison-Knudsen Co., Inc., has a $21 million contract for construction of the dam. M-K is represented by George Piedmont as project manager and L. B. True as project engineer.

Penstocks are being fabricated and installed under a separate $600,000 contract by Chicago Bridge & Iron Co. Separate contracts also have been awarded for furnishing and installing mechanical and electrical equipment. The turbines are being made by Allis-Chalmers, the generators by General Electric, and the other major electrical equipment is being manufactured by Westinghouse.

Moving rails, roads and wires above Noxon Rapids is . . .

Another Major Part of Dam Construction

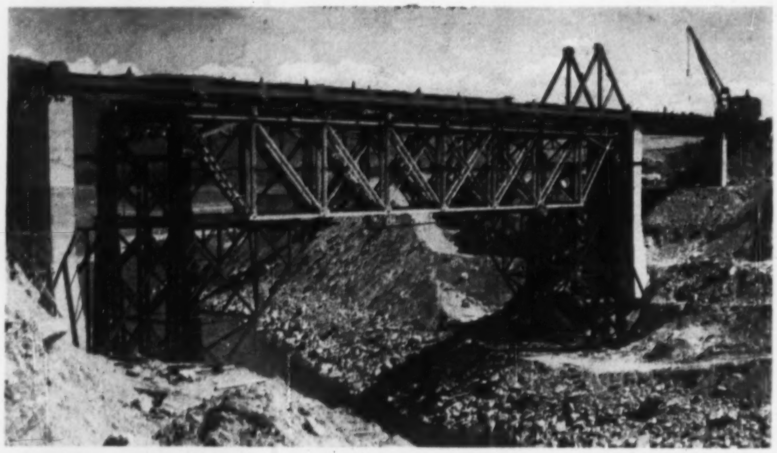
Relocation work is a major part of Noxon Rapids Dam construction in Montana. Total cost of all relocations is about $22 million, which exceeds the value of the Morrison-Knudsen contract for building the dam proper.

Biggest part of the relocation work is moving 17½ miles of main line tracks of the Northern Pacific Railroad. Total value of the railroad relocation is $17 million.

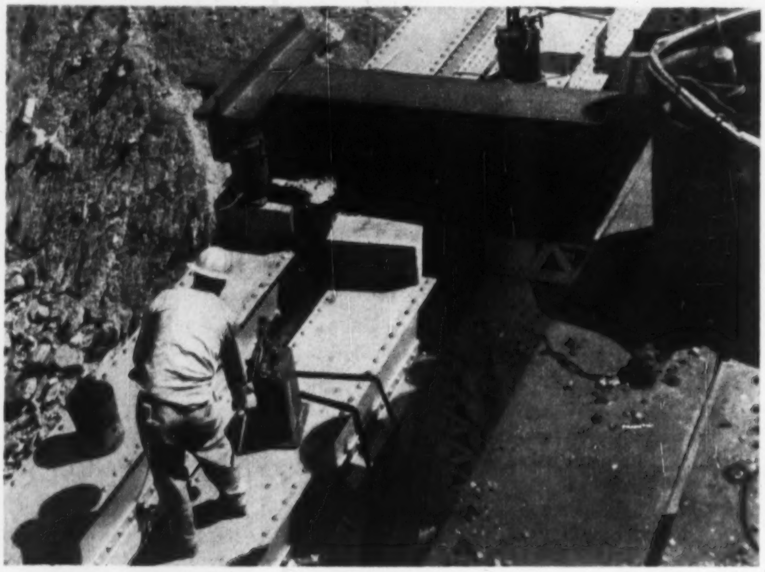
The railroad now runs along the south bank of Montana's Clark Fork River. In the relocation work, it will be moved to the north bank below the dam, and back to the south bank near the reservoir headwater. Had the railroad been left on the south bank, construction would have included difficult rock excavation and tunneling.

In addition to the railroad relocation there are 9½ miles of new state highway to be built, more than 21 miles of new county roads and 4½ miles of access roads. Besides the rails and roads there are a number of transmission lines in the reservoir area. These include an extensive REA grid, a 12 mile line belonging to Northern Lights, Inc.—a utility serving Sandpoint, Idaho—and 2½ miles of Bonneville Power Administration 230 kva lines.

Included in the highway work is one bridge. The railroad work includes five bridges and three overpasses.



ALUMINUM FALSEWORK is used to erect the biggest railroad bridge on Noxon Rapids Dam relocation work. These aluminum trusses were used before.



WORKMAN JACKS camber into outside aluminum truss to make it match the sag in the inside truss resulting from floor system load.

• **Falsework is reused**—One of the biggest relocation jobs is "Bridge 57" for the railroad. This is a 360 ft span, single track steel truss crossing of the Clark Fork River. It has girder side spans of 120 ft and 160 ft length.

The construction schedule on Bridge 57 was such that a normal falsework system for erecting the steel could not be used due to the danger of high water. As an alternate to this, a falsework system using aluminum trusses has been adopted by Kansas City Bridge Co., steel fabricators and erectors. The trusses are the same units that were used for erection of steel truss spans on the Richmond-San Rafael Bridge (ENR Nov. 4, 1954, p 33). But the work on Bridge 57 was, perhaps, even more complex than construction of the bay-spanning Richmond-San Rafael trusses.

(Use of this aluminum falsework at

Built-in optical plummets eliminate plumb bobs save set-up time...improve accuracy

Gurley OP-57

Gurley OP-137

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The Gurley Optical Plummet Transits are furnished with tripods which have built-in shifting heads. They allow a two-inch shift of instrument over the point, providing greater latitude in initial set-up.

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For *each* of 4 digging wheel speeds this transmission provides 12 individual crawler speeds forward and 12 reverse, all closely and evenly graduated. The 48 forward speeds give the operator a choice of over 30 *practical* digging speeds—over 30 usable *combinations* of digging wheel and crawler speeds, providing the *right* combination of power and speed for digging every soil, under every digging condition. The following table of non-slipping, power-saving digging speeds for the Cleveland 95 is typical.

Cleveland's exclusive multi-speed transmission has no equal

For each of 4 wheel speeds	there are 12 individual crawler speeds											
With Main Transmission (and Digging Wheel) in	SPEEDS (in Feet per Minute) — Available in Either Direction (Bold Face Indicates Most Commonly Used Digging Speeds)											
First Speed	**.5**	**.7**	**1.1**	**1.5**	**2**	**2.8**	**3.4**	4.7	5.9	12.6	22.5	38
Second Speed	**1**	**1.4**	**2.2**	**2.9**	**3.9**	**5.3**	**6.6**	**9**	11.5	23.8	43	73
Third Speed	**2**	**2.8**	**4.3**	**5.8**	**7.8**	**10.6**	**13.3**	**17.9**	**22.8**	47	86	146
High Speed (Ordinarily used when digging)	**3.3**	**4.6**	**7.1**	**9.5**	**12.8**	**17.5**	**21.7**	**29.6**	**38**	**78**	143	240
Reverse (not used when digging)	.4	.6	.9	1.2	1.6	2.2	2.7	3.7	4.8	9.9	18	30

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Good Everywhere

RAILROAD CUT nears completion on the 21½ mi railroad relocation.

the San Francisco Bay crossing was an innovation credited to Judson-Pacific-Murphy Corp. and Peter Kiewit Sons Co., the contractors on that bridge. Specifically, the credit went to J. Philip Murphy, president of the firm sponsoring the J-P-M joint venture.)

First step was to erect a pair of the aluminum trusses, piece by piece, using cranes working at ground level to do the lifting.

As the aluminum trusses are only 280 ft long, temporary towers with inclined shoring trusses were erected to support the falsework system.

A single pair of the aluminum trusses was not considered strong enough to support the entire load of the steel bridge construction. So after the bridge steel floor system was in place a second pair of trusses was added outside the first pair of aluminum trusses using a railroad crane.

Original camber in the aluminum trusses is plus 7½ in. The bridge floor system load deflected the first pair of trusses so the camber became minus 1½ in. So, after the outside trusses were in place they were jacked down to match the camber of the first trusses. Then the load was placed equally on all four trusses.

Design of the railroad relocation work was handled by Ebasco Services, Inc., except for the railroad bridges. These were designed by Sverdrup & Parcel of St. Louis. The highway relocation work was designed by Morrison & Maierle of Helena, Mont.

Many contractors are involved in the relocation work. Some of the major work is being done by Peter Kiewit Sons' Co., Guy F. Atkinson Co., and Bud King Construction Co., Missoula, Mont. Three Spokane, Wash., firms handling other major parts of the relocation construction include: Murphy Bros., James Crick & Sons, and Hansen & Parr.

moneymakers*

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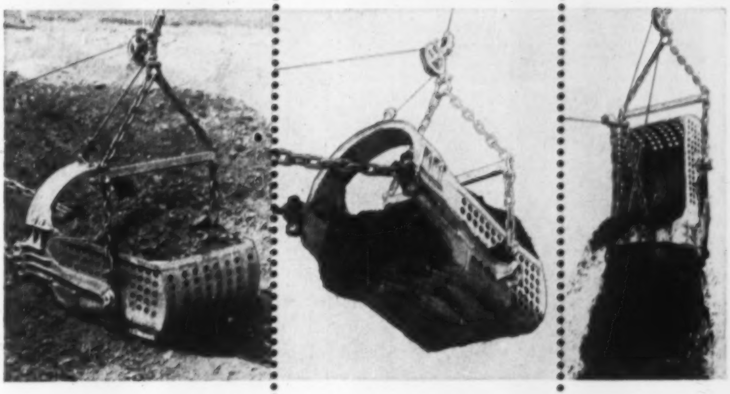
DRAGLINE BUCKETS



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D397
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430 HP†

New D353
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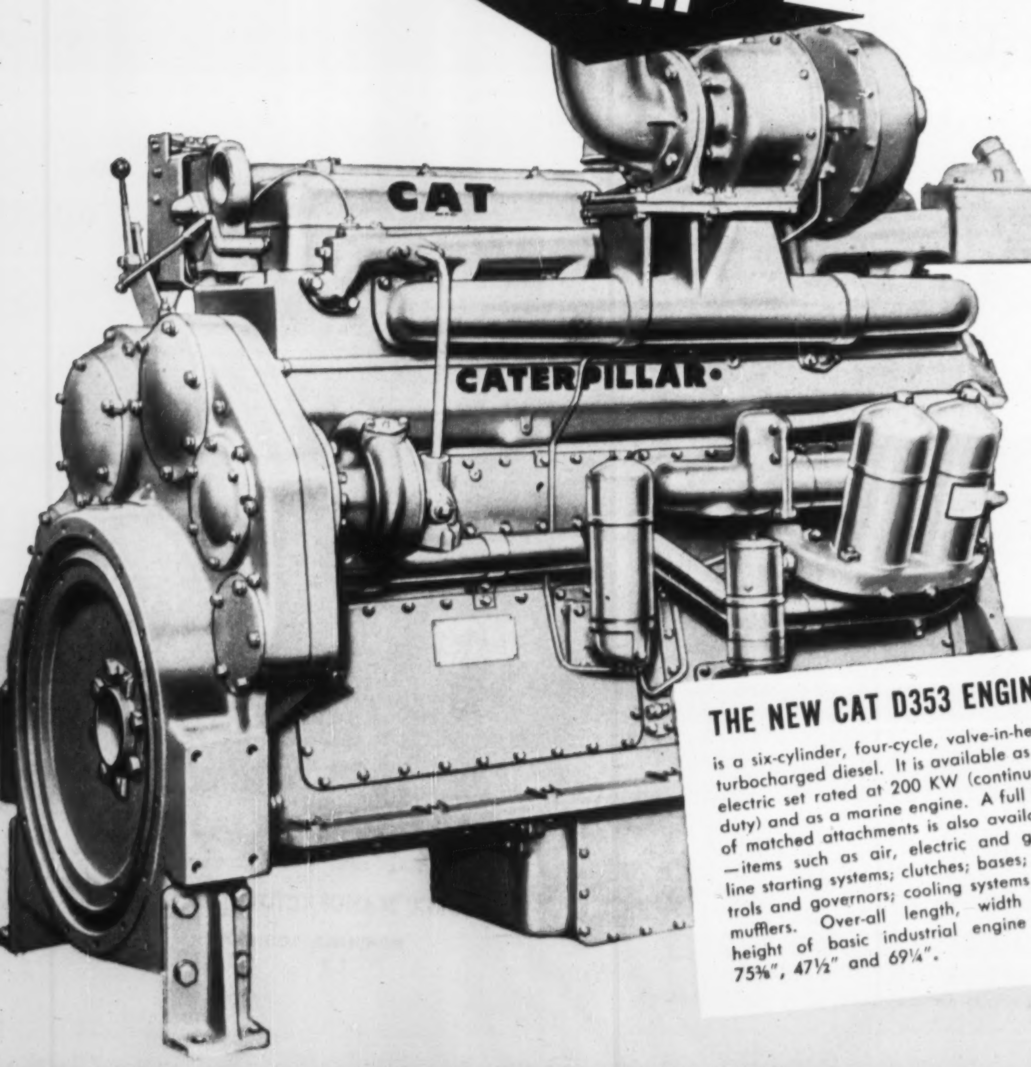
D342
225 HP†

D339
140 HP†



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		(SERIES G)	(SERIES G)			
310 HP†	200 HP†	175 HP†	115 HP†	137 HP†	91 HP†	65 HP†

†Maximum output capacity

Adding to Caterpillar's line of modern heavy-duty engines, there's now the Turbocharged D353 rated at 390 HP (maximum output capacity). This engine, a prototype of the unit in the mighty D9 Tractor, is job-proved after thousands of hours of operation in the field!

Like all modern CAT* Diesels, the D353 incorporates in its design the advanced features developed by Caterpillar in a quarter century of diesel leadership. Compact and sturdy, it is built for the hard work. Its four-cycle design delivers the long, effective power stroke that puts power to more efficient use than other types of engines. Its turbocharger utilizes waste energy from the engine exhaust to increase over-all efficiency and economy. Its fuel system requires no adjustment. There are no cylinder ports to clean. And its exclusive Caterpillar single-orifice injection valves, combined with the precombustion chambers, permit the use of a wide range of fuels including premium diesel fuels as well as low-cost No. 2 furnace oil *without fouling*. All these and other features add up to performance that no unit in its power class can match.

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For complete information about the new D353 and other Cat Diesels, see your Caterpillar Dealer. Let him show you how diesel leadership based on a quarter century of experience can engineer the modern, heavy-duty diesels of tomorrow.

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South Bend, Indiana, got its money's worth in this new $5,587,000 sewage disposal plant, built with the protection of an INA performance bond. Sollitt Construction Co., Inc., was the contractor.

CONTRACT WON...

INA's extra value helped to lower bid

When the bids are in and the qualifications compared, the winning contractor is often the one who has successfully economized in small ways. It is 'extra value' for the contractor if he can economize without sacrificing quality of service.

The contractor realized INA's extra value in a performance bond of Indemnity Insurance Company covering the disposal plant above. It was arranged through the local independent agent. Indemnity, with its broad bonding experience, formulated a plan to assure minimum rate. This resulted in a saving to the contractor equal to more than one-third of the difference between the successful contract bid and the next lowest.

This is but one example of extra value in coverage and, for contractors who qualify, minimum rates* and prompt handling of every need.

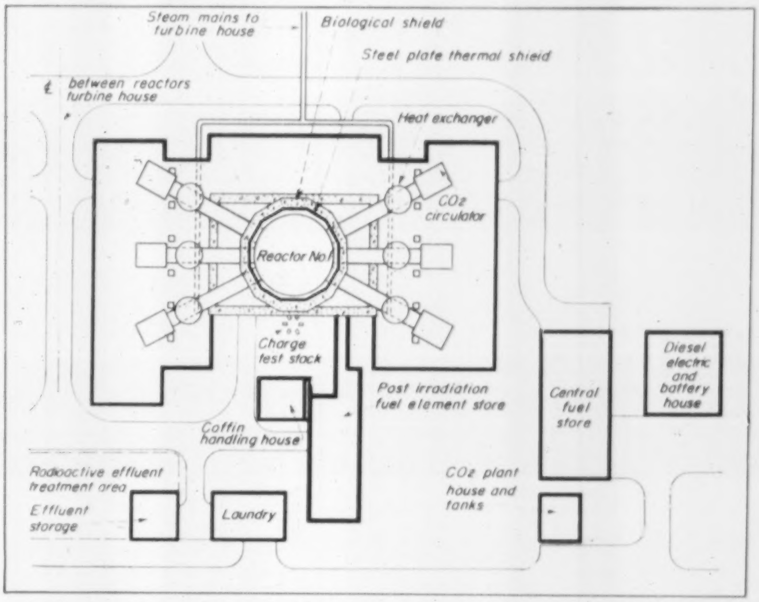
*Not available in Louisiana and Texas

INSURANCE BY NORTH AMERICA INA 1792

INDEMNITY INSURANCE COMPANY OF NORTH AMERICA

Engineering advances for fourth big plant puts . . .

British Close to Competitive A-Power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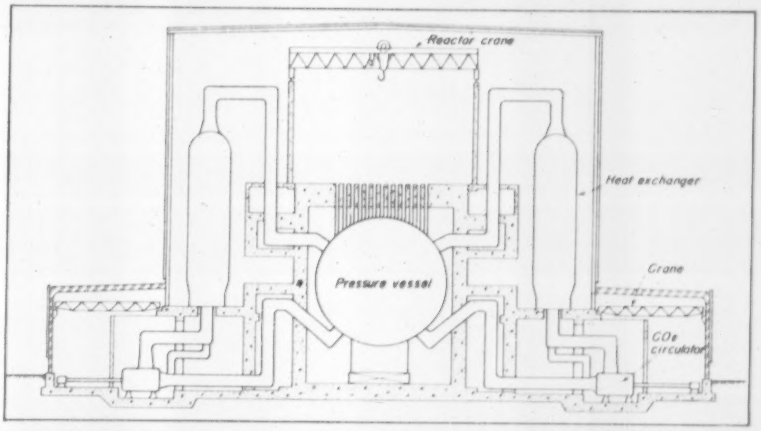
℄ between reactors turbine house
Heat exchanger
CO2 circulator
Reactor No 1
Charge test stack
Post irradiation fuel element store
Central fuel store
Diesel electric and battery house
Coffin handling house
Radioactive effluent treatment area
Effluent storage
Laundry
CO2 plant house and tanks

LAYOUT OF NUCLEAR PORTION of 500,000 kw Hinkley Point station in England. The reactor pressure vessel is to be 67 ft in dia and work under 175 psi pressure. Reactor's electrical rating has been raised 55% through engineering refinements and innovations.


Reactor crane
Heat exchanger
Crane
Pressure vessel
CO2 circulator

SECTION THROUGH plant. Carbon dioxide gas is circulated through pressure vessel, then to exchanger where it gives up heat to produce steam. During construction, 400 ton traveling crane (not shown) will straddle reactor buildings.

Outstanding engineering advances have brought the estimated operating cost of Britain's fourth commercial nuclear power plant—a 500,000 kw installation at Hinkley Point in Somerset—to a very competitive 7 to 7.5 mills per kwh. This is about the price at which conventional British thermal plants can produce power using domestic coal.

However, a nuclear plant of latest British type, which is patterned after the Calder Hall prototype, transplanted in the U. S. would cost a private power company about 15 mills per kwh to operate. The increase is due primarily to higher construction costs in the U.S. and tax and profit margins required of private companies.

Capital cost of the Hinkley Point plant is estimated at $168 million, or $335 per kw installed. This does not include up to $100 per kw more for the uranium fuel elements. And the predicted operating costs also are dependent on the value of plutonium, a byproduct of nuclear power generation.

Hinkley Point's attractive cost picture stems from increasing the electrical rating of each reactor by 55%, achieved by a joint venture of English Electric-Babcock & Wilcox-Taylor Woodrow engaged by Britain's governmental Central Electric Authority. The consortium's engineering team explained that the increase was due to no single innovation, but rather notching up of the major design parameters.

Layout and design principles at Hinkley Point follow those at the three other British Nuclear power plants under construction, and the 67 ft dia pressure vessels are of almost identical size. The current nuclear plants in Britain employ reactors using natural uranium as fuel, wherein the piles are cooled by carbon dioxide, which in turn gives up its heat in exchangers to produce steam that drives turbines. The pressure vessels contain the carbon dioxide, as contrasted to U. S. reactor designs which utilize large pressure vessels only to contain a possible break in much smaller pressure vessels containing the reactor.)

Although details of the engineering advances contributing to the announced 55% increase in electrical efficiency—the 500,000 kw plant comprising two reactors has a thermal rating of 2,000,000 kw—were mostly secret, ENGINEERING NEWS-RECORD's London correspondent has uncovered several bits of information. A 15% contribution stemmed from improved heat transfer between piles and gas between gas and steam, utilizing extruded helical fins instead of machined transverse fins.

Other notable increases include raising the carbon dioxide pressure to 175 psi—a 20% increase over current operating pressures and 75% more than used at Calder Hall (ENR Oct. 25, 1956, p. 48)—and a considerable, though undisclosed, rise in maximum gas temperature. Maximum steam conditions of 650 psi and 700 F show little

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change from the three other large nuclear plants under way in Britain.

• Notable structures—Hinkley Point also will feature some notable structures and methods of erecting same. Probably the largest traveling crane ever to be built will enable efficient erection techniques to be adopted. It will be mounted 175 ft high on rails 285 ft apart straddling the site and will be able to lift 400 tons. The crane has been designed for easy dismantling to permit shipment to other nuclear station sites.

The 67 ft dia reactor pressure vessel will be made of 3 in. thick mild steel boiler plate that will weigh 1,700 tons, including 13 tons of weld deposit. The graphite and uranium core, weighing 5,500 tons, will sit on an egg crate of box girders framing into a 30 ft dia internal ring girder. An external girder of the same diameter below the internal girder will relieve the spherical vessel of core load and take the combined load from core and sphere directly to rock. This arrangement largely dispenses with massive concrete rafts that were characteristic of earlier nuclear stations.

This rigid method of support involves no mechanical joints, pins or rollers required in other designs to accommodate thermal expansion and contraction. The consortium, which will furnish a complete facility, states that thermal stresses will be controlled by a "simple but ingenious thermal device."

A closed circuit TV system installed in the control room will monitor critical structural areas in the sphere, graphite core, supporting grid, gas ducts and heat exchangers in addition to its main function of monitoring loading uranium into the reactor.

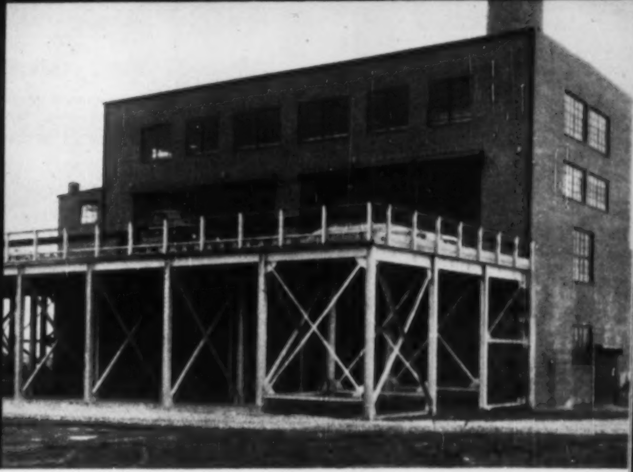
Shielding for each of the two reactors will consist of a 90 ft high, 7 ft thick, 12 sided concrete structure lined with steel plate.

Construction of the power station will require about 300,000 cu yd of concrete and 12,000 tons of reinforcing steel.

• Plant hardware—Hinkley Point will contain six main turbo-alternators of conventional design, each rated at 93,500 kw. Cooling water will be provided from the sea at the rate of 840 mgd.

Each reactor will be served by six dual pressure heat exchangers that have 3½ times the capacity of those at Calder Hall with increases in height and diameter and only 20% and 25%, respectively. The completely assembled heat exchangers will be 21½ ft in dia and 90 ft high.

Exterior view, showing ash tunnel entrance at right center.



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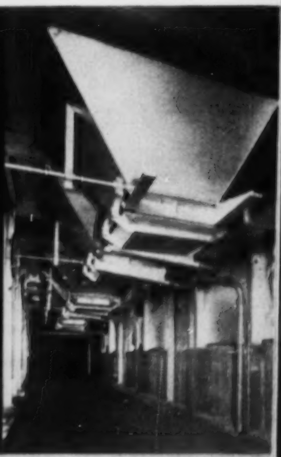

Ash hoppers in drive-through tunnel.

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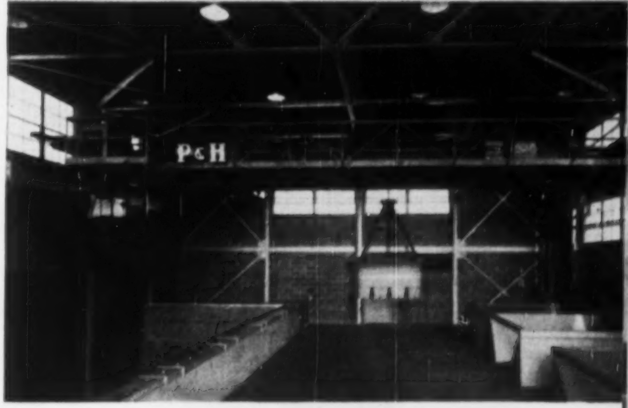

Charging floor, storage bin and crane.

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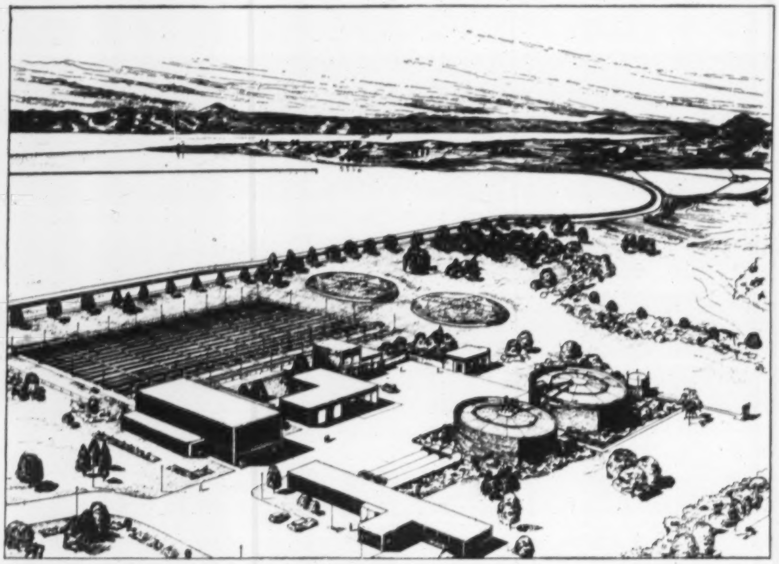


In New Zealand's Manukau sewerage system . . .

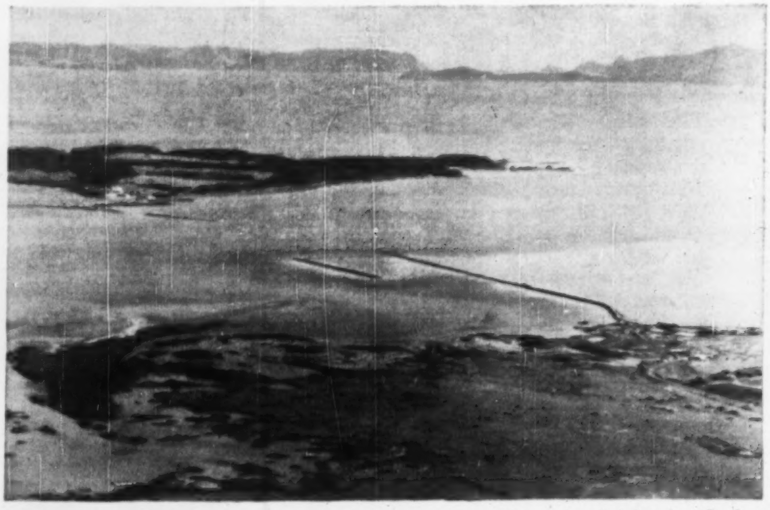
Oversized Ponds Oxidize Wastes

Oxidation ponds that well may be the world's largest for secondary sewage treatment are under construction in New Zealand. Planned by a board of experts from the United States, the Manakau plant will be one of the most modern of its type in the world.

The completed project, under control of the Aukland Metropolitan Drainage Board, will collect and treat all sewage and industrial wastes from a 200 sq mi area with a predicted saturation population of 800,000.

In planning and design of the system, several factors had to be considered. First, pollution of the harbors had to be abated since the waters are widely used for swimming and recreation Second, since no large natural streams exist for dilution, plans had to include complete treatment. And chlorine could not be relied on to sterilize effluents because of its high cost and the uncertainty of its supply in New Zealand.

• Sewer construction. The sewer system—including trunk and intercepting

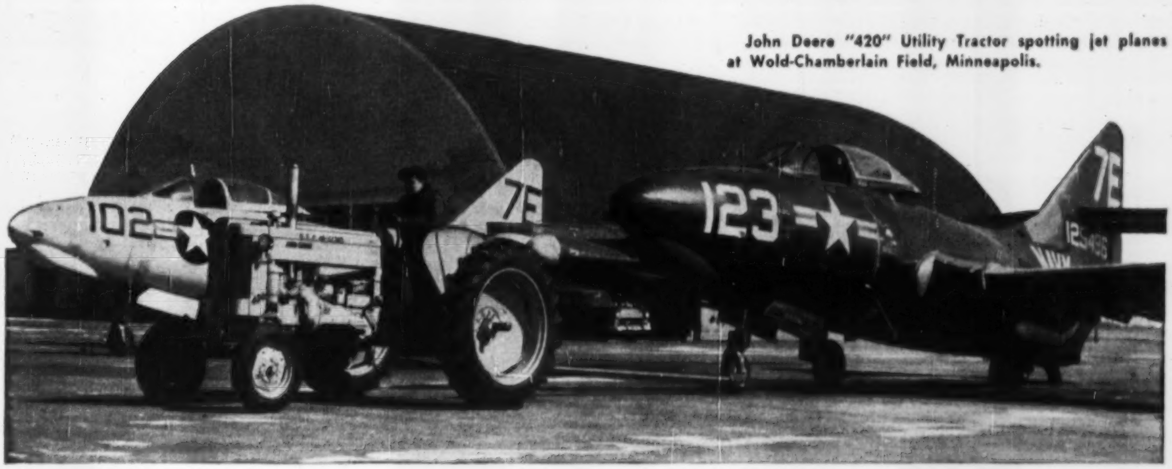


OXIDATION PONDS containing unicellular algae will be enclosed behind cofferdams now being built in Manukau Harbor. There will be plenty of space for oxidation.

Jet Planes, Box Cars, or Earth...

THESE JOHN DEERE TRACTORS

Move Anything...at Lowest Cost


John Deere "420" Utility Tractor spotting jet planes at Wold-Chamberlain Field, Minneapolis.

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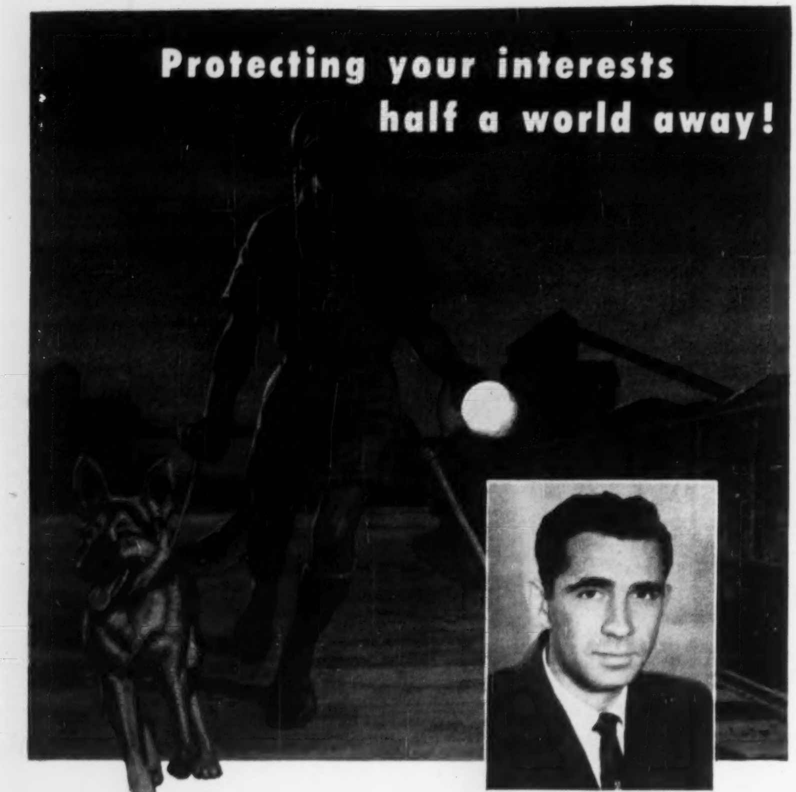

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sewers, delivery mains, and pumping stations—is now under construction. A total of 10 miles of tunneling is involved through difficult volcanic terrain.

Sewer sizes will range from 48 in. dia mains to 102 in. equivalent diameter reinforced concrete eliptical sections. Along one interceptor a 6,000 ft reinforced concrete inverted siphon is under construction in a trench along the harbor bed. Some 3,500 ft of this line must be laid below the mean high water level.

To resist sulphide corrosion, high strength concrete with pozzolanic materials added is being used.

- **Treatment plant.** A 1,500 acre site provides the location for a sewage treatment plant capable of treating 32.9 mgd. Primary treatment will include screening, preaeration, grit removal, and sedimentation. Ten preaeration and grit removal tanks, each 45 x 38 ft in size, are designed to have a detention time of 1.2 hr. Ten sedimentation tanks 230 x 38 ft having an average water depth of 9 ft will complete the primary treatment cycle.

Sludge digestion will be done in conventional digester tanks with the digester gas to be used as fuel.

- **Secondary treatment.** Four oxidation ponds covering an area of 1,390 acres will provide secondary biological treatment. These ponds will have a capacity of 5,400 acre-ft with a detention time of 62 days. They are designed to give continuous recirculation. This will be done by pumping both the primary effluent and the recirculated effluent through a low level circulation channel. Aerobic conditions will thus be assured by thorough mixing.

Unicellular algae, possibly chlorella or similar species, will be the oxidizing agent.

- **Original estimates low.** In November, 1954, a team of American and British engineers and scientists estimated the cost of the project at \$22.4 million and construction was begun. The AMDB recently learned that the completed system actually will cost them \$31.8 million—a 40% jump above the original estimate.

The men who planned the system are David H. Caldwell, of the firm of Brown & Caldwell of San Francisco; Charles Gilman Hyde, ex-professor of sanitary engineering at the University of California; A M Rawn, general manager and chief engineer of the Los Angeles County Sanitation District; John T. Calvert, of the firm of John Taylor & Sons of London; and Harold Wilson, a British chemist.

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"FAST TRIGGER-ACTION CONTROLS almost double our loader output!"

"I'm really amazed at the speed and ease of maneuvering this big 1½-cu. yd. Case® TerraTrac® '800' tractor-shovel," reports Contractor Robert Leslie, New Kensington, Pa. "Because of its trigger-action hydraulic shifting and steering — plus higher reverse speeds — *I am able to complete TWO cycles for every ONE made with my former crawler rig."*

Counter-rotation pays off

Leslie, who operates a sizeable spread of equipment in his general contracting business, finds that torque-converter drive and hydraulic Terramatic transmission pay big dividends in basement and roadway excavation. "My 1½-cu. yd. '800' has surprising power for tough digging," he says. "Furthermore, the ability to drive one track *forward* and the other *reverse*, at the same time, makes it easy to finish sidewalls and square-off corners, without the usual backing and jockeying for position."

"My '800' gets much better traction than other loader-tractors in these Pennsylvania hills," Leslie reports, *"because the torsion-bar suspension enables both tracks to oscillate up and down over irregular ground. This also means less strain on the track-frame and equipment — and a lot smoother ride for the operator."*

"Operator's dream"

"Visibility for the operator is perfect," says Leslie. "I can see both sides of the bucket and tell exactly where I am cutting. It's also *easier to get on and off* the tractor, without climbing over a mass of levers."

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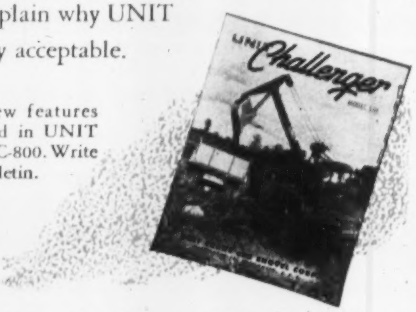

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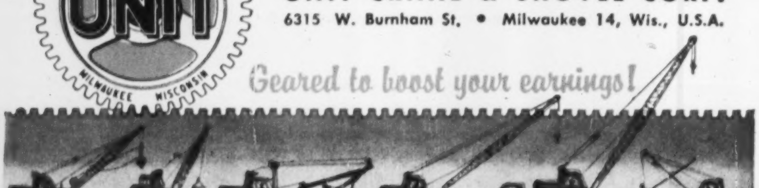
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Books

Nuclear Power Plants

NUCLEAR ENGINEERING—Edited by Charles F. Bonilla. 850 pp. McGraw-Hill Book Co., New York, Toronto, London. $12.50.

Intended both for use as a text and reference work on engineering required for nuclear power plants, this book was written by 12 experts in various fields. If presents fundamentals briefly and clearly.

Civil engineers should find several chapters of this book particularly enlightening and helpful in understanding the characteristics of nuclear reactors that distinguish them from conventional power plants. The chapters on nuclear particles and nuclear physics, for example, should be useful in bringing them up to date on developments since they studied physics and chemistry. The chapters on basic concepts of radiation protection and shielding of power reactors apply basic principles to the design of some of the unconventional features of this type of power plant. A chapter covers mathematical analysis of plastic flow under high thermal stress.

Also of interest to civil engineers among the 15 chapters in the book are those on power generation, nuclear reactor types and legal aspects of power. In the chapter on power generation, the demand for electrical energy in the near future is analyzed and the possibility of meeting it with nuclear power investigated. Fuels are compared and power-cost trends discussed.

In the following chapter, characteristics of various reactors are summarized. The advantages and disadvantages of 15 different types are outlined in a series of tables.

The chapter on legal aspects covers not only the significance of the Atomic Energy Acts of 1946 and 1954 but also the general role of the federal government in the nuclear engineering field. It covers construction permits and requirements for various types of licenses, government assistance and security clearance. There is also a brief discussion of patents, Atomic Energy Commission–Defense Department relationships and international activities.

Properties of Soils

BASIC SOILS ENGINEERING—By B. K. Hough. 513 pp. Ronald Press Co., New York, N. Y. $8.

Here is an easy-to-understand text on soils for construction purposes. Covering soils engineering from a broad viewpoint, it should be useful to nonspecialists in this field as well as to students.

"The soils engineer," the author says, "is concerned with the way the natural formation behaves when it serves as the foundation or an integral part of a structure . . . While emphasis on utilization of principles of mechanics led at one time to the designation of the whole field of soils engineering as soil mechanics, the techniques used today are derived from many fields, including geology, pedology, the soil sciences, architecture, engineering and construction practice."

In line with this philosophy, a large portion of the book is devoted to the basic characteristics of soils: origin and composition, effects of particle size and shape, effects of moisture, textural classification, consistency, behavior as determined by structure, shearing strength, and compressibility and consolidation theories. A new concept of soil structure is presented, holding that particle-to-particle contact in true clays may be the exception rather than the rule. Also included is a new theory relating the compressibility of clays to osmotic force, as an alternative to the bridging theory. And a chapter is devoted to stress analysis.

However, practical applications are not overlooked. Structural foundations, earthwork and highway and airfield construction are well treated, as are methods for improving soil conditions by compaction and stabilization.

Reports & Pamphlets

WATER RESOURCES PAPER No. 118—Director, Water Resources Branch, Department of Northern Affairs and National Resources, Ottawa 4, Ont., Canada. $3.00.

PATENT NOTES FOR ENGINEERS—by C. D. Tuska. 192 pp. McGraw-Hill Book Co., 330 W. 42nd St., New York 36. $4.00.

ELECTRICAL SYSTEMS DESIGN—by Joseph F. McPartland. 140 pp. McGraw-Hill Book Co., 330 W. 42nd St., New York 36. $6.00.

LANDSLIDES IN CLAYS—by Alexandre Collin. University of Toronto Press, Toronto, Canada. $6.50.

WATER SUPPLY & TREATMENT—by Merrill L. Riehl. 221 pp. National Lime Association, Washington 5, D. C. $2.00.

INVESTIGATIONS OF THE EFFECT OF SOME POZZOLANS ON ALKALI REACTIONS IN CONCRETE—Progress Report L-1—Committee on Alkali Reactions in Concrete, 20 Borgergade, Copenhagen K, Denmark.

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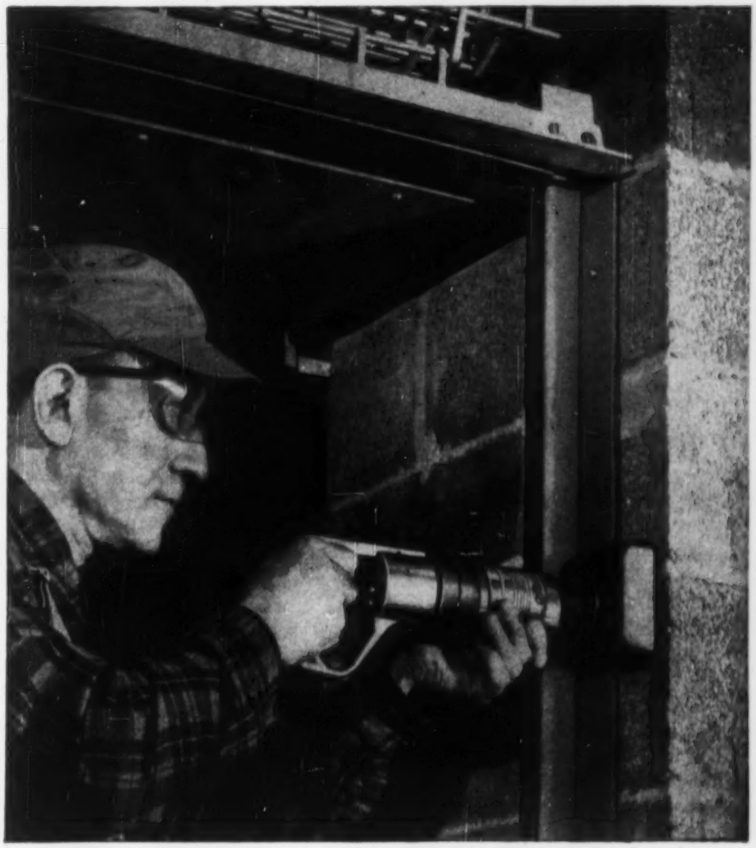

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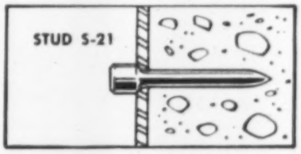


¼" Remington S-21 Stud with 22 caliber Power Load is recommended for the application above . . . no pre-drilling required. There's a special stud to fit your needs, a Power Load to handle the job.

There's no time lost with this cartridge-powered fastening tool! It sets ¼" or ⅜" diameter studs in concrete or steel . . . up to *six* a minute, either size. Barrel change-over takes only 90 seconds *right on the job*. Over 40 Remington Studs to choose from, plus 22 and 32 caliber Power Loads scientifically graded to furnish *exact* power you need. Cuts costs, saves time on light, medium or heavy-duty fastenings!

FREE BOOKLET tells how and where to use the Stud Driver. Clip and mail coupon today for your copy.

REMINGTON STUD DRIVER

Industrial Sales Div., Dept. ENR-12
Remington Arms Company, Inc.
Bridgeport 2, Conn.

Please send me your free booklet which shows how I can speed the job and save with the Stud Driver.

*Name*______ __________*Position*________
*Firm*__________________________
*Address*________________________
*City*_________________*State*________

Remington

DU PONT

STUD DRIVER

Blaw-Knox paving equipment helps set production record on Illinois Toll Road

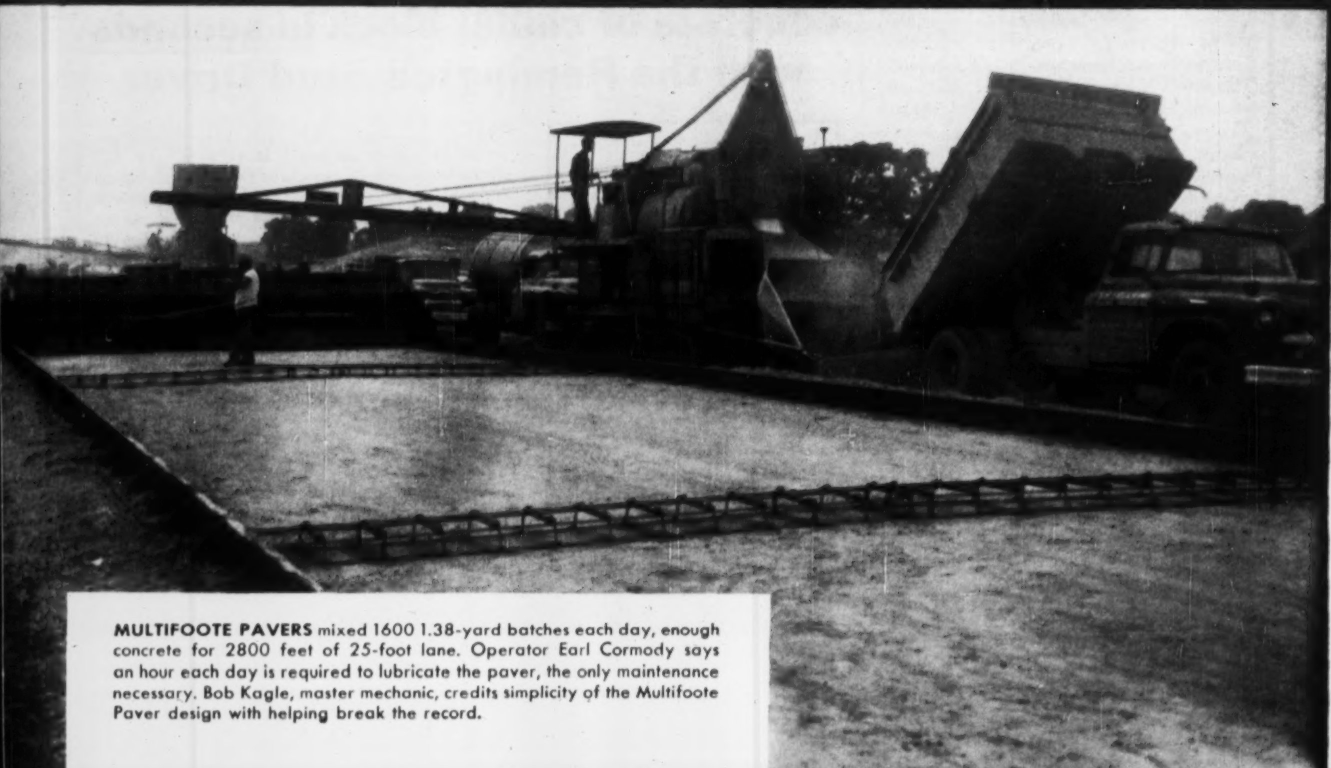
Rugged automatic equipment paves 3100 feet of 10-inch reinforced concrete, 25 feet wide, in a day's operation

Anthony Constantino, general superintendent for John C. Peterson Construction Corporation credits the "high efficiency and durability of the Blaw-Knox Machines" his company used on the Illinois Toll Road with an outstanding contribution to the performance of the John C. Peterson Construction Corporation Forces.

Reynold (Scotty) Scott, paving superintendent states that "The machines took a terrific beating by constant usage, but they have proven themselves to be rugged, durable and efficient. Any downtime would hold up the job with a serious financial loss, but with the Blaw-Knox Machines, we were able to complete our operation well ahead of schedule."

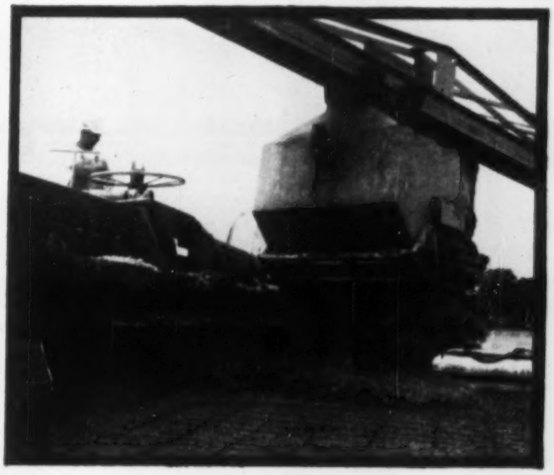
Record-shattering production to rigid specifications like those set for the Illinois toll road is being delivered time and again by Blaw-Knox Concrete Paving Equipment. All over America, contractors are squeezing more value out of their equipment dollar with Blaw-Knox machines. They're rugged, built for automatic, high production rates that mean more profit on every job. Why not see your Blaw-Knox dealer? He has all the details.

BLAW-KNOX PAVING EQUIPMENT USED: 10,000 10" x 10' self-aligning road forms—precision Subgrader 2-34E Dual Drum Concrete Pavers—two Concrete Spreaders (one with vibrator)—Concrete finisher—Base Paver—Road and Shoulder Widener—Automatic Cement and Aggregate Batch Plants—four 6 cu. yd. HiBoy Trukmixers.



MULTIFOOTE PAVERS mixed 1600 1.38-yard batches each day, enough concrete for 2800 feet of 25-foot lane. Operator Earl Cormody says an hour each day is required to lubricate the paver, the only maintenance necessary. Bob Kagle, master mechanic, credits simplicity of the Multifoote Paver design with helping break the record.

BLAW-KNOX SUBGRADER cuts and levels the grade to the required 10" template. Running on Blaw-Knox road forms, the subgrader excavates the vibration of the forward edge of the cutting tool. Quick adjustable strike-off gives perfect final crown to the grade.



SPREADER distributes concrete uniformly to correct width and elevation without disturbing contraction joint baskets or reinforcing mesh. It is the only spreader that moves concrete longitudinally and transversely. Vibrator attachment consolidates and seals-off concrete for fast accurate finishing.

FINISHER strikes-off concrete to required crown and trowels surface, minimizing final floating operation. Quick crowning screed boards meet super elevated curves and tangent pavement. Wide screed ends prevent spillage.

Electronically Controlled Batch Plant delivers once every 15 seconds

This Blaw-Knox automatic Batch Plant, owned by Certified Transit Mix Corporation kept 32 batch trucks rolling to the paving site seven miles away. Warren Morreale, plant superintendent, credits the smooth, high speed operation of 240 batches per hour with helping to set the paving record.

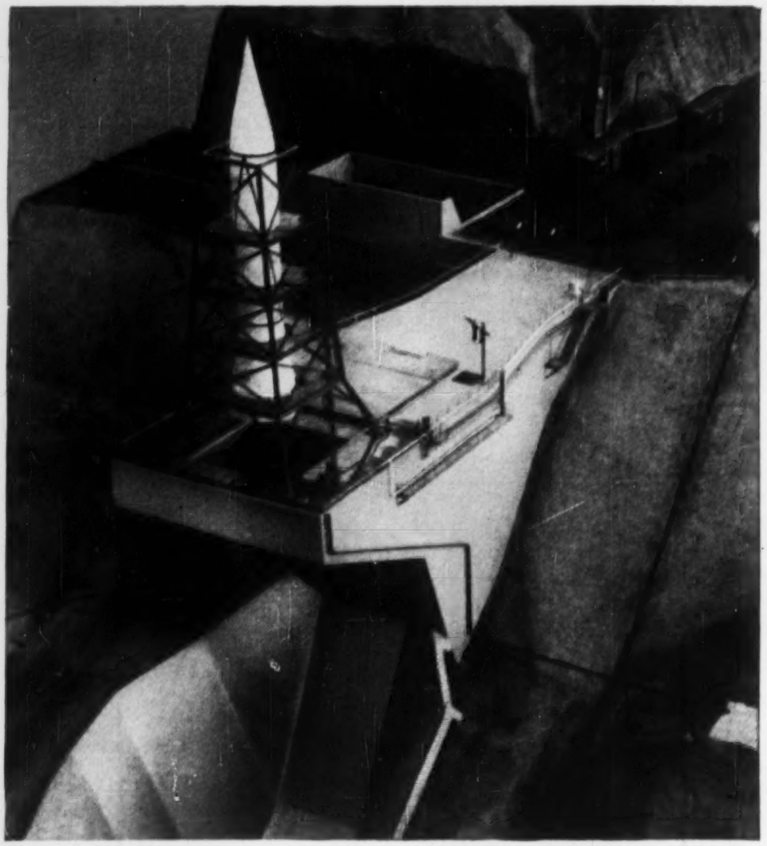
CERTIFIED
TRANSIT MIX
CORPORATION
COMMACK
L.I. N.Y.

BLAW-KNOX

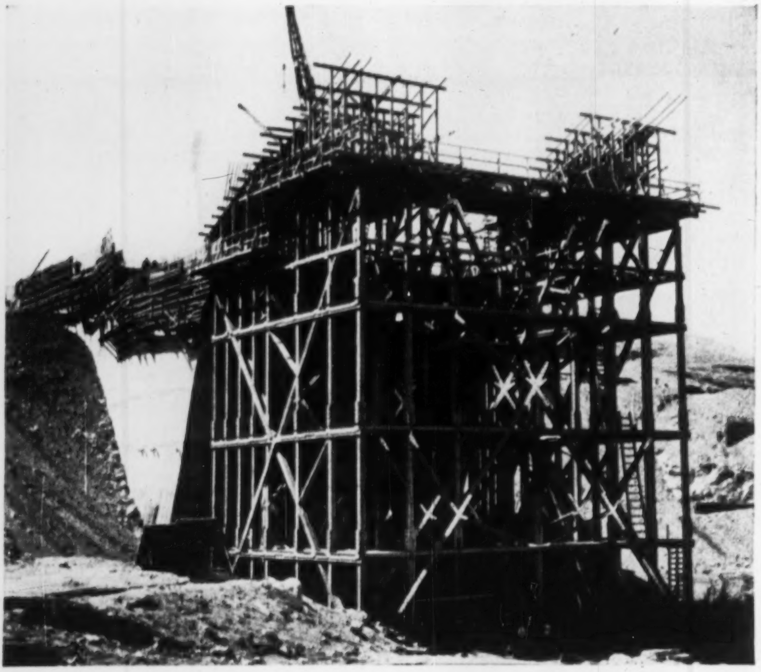
BLAW-KNOX COMPANY

Construction Equipment Division

41 Charleston Avenue, Mattoon, Illinois



MODEL of experimental rocket engine test station, Air Research and Development Command Flight Test Center, Edwards Air Force Base. Criteria established by Rocket Engine Test Laboratory, R. F. Gompertz, Chief. Designed by the Ralph M. Parsons Co., Los Angeles. Contractor, George A. Fuller Co., New York and Los Angeles. Concrete subcontractor, Carbro Construction Corp., Los Angeles. Construction supervised by Los Angeles District, C. of E., U. S. Army.



TIMBER FALSEWORK TOWER, 100′ high, supports concrete forms for cantilever. Because of the great mass of the cantilever arms, they were cast in increments; first a 15′ lift, 3 successive 7′ lifts, and a final 4′ lift.

Concrete cantilever takes 1,000,000 lb. rocket thrusts

CANTILEVERED out 52′ from a hillside in the Mojave Desert, a huge concrete test stand speeds U. S. rocket development. Its spectacular cantilever, built of massive concrete which eliminates resonant vibration, can resist the fury of 1,000,000 lb. thrust rocket engines, and provides 150′ clearance between the test platform and flame-deflection pit for preliminary tests of rocket engine jettisoning.

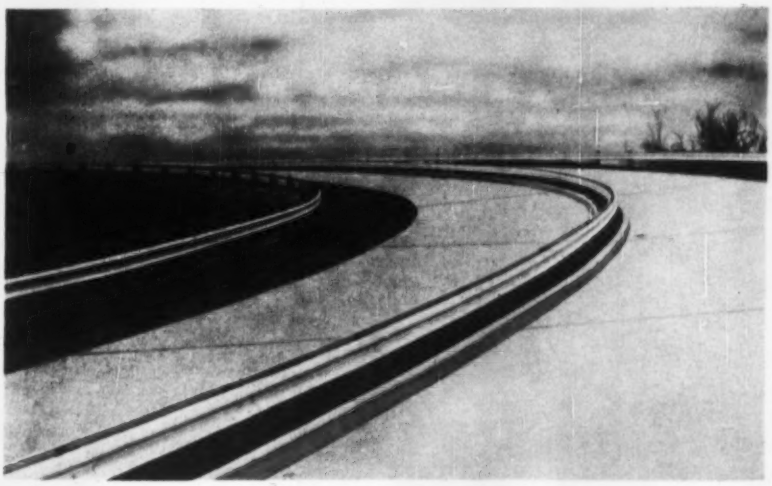
The 52′ cantilever is 70′ wide, measures 40′ thick at the haunch and 15′ at outer end. Test stand is 203′ long, and goes deep into the hillside to reach granite bedrock. Deepest footing, 146′ below the deck, is 10′ thick, 30′ wide, 120′ long.

The installation required 26,000 cu. yds. of low slump (2″) concrete. To meet a fast production schedule, form work was done by day shift and concreting at night, by continuous pours which averaged 250-350 cu. yds., the maximum being 750 cu. yds. Efficient production was facilitated by using ready mixed concrete, processed in truck mixers of certified design, capacity, mixing speed and water control accuracy.

NAMCA
5 1/2 CUBIC YARD
MIXER
7 1/4 CUBIC YARD
AGITATOR

You have a right to insist on this Rating Plate. It certifies compliance with the high industry standards maintained for your protection by the Truck Mixer Manufacturers Bureau.

BLAW-KNOX CONSTRUCTION EQUIPMENT DIV.
Mattoon, Ill.
CHAIN BELT COMPANY
Milwaukee, Wis.
CHALLENGE MANUFACTURING CO.
Los Angeles, Calif.
CONCRETE TRANSPORT MIXER CO.
St. Louis, Mo.
CONSTRUCTION MACHINERY CO.
Waterloo, Iowa
THE JAEGER MACHINE COMPANY
Columbus, Ohio
THE T. L. SMITH COMPANY
Milwaukee, Wis.
WESTINGHOUSE TRANSIT MIXER DIV.
Indianapolis, Ind.
WHITEMAN MANUFACTURING CO.
Pacoima, Calif.
WILLARD CONCRETE MACHINERY CO., LTD.
Lynwood, Calif.
WORTHINGTON CORPORATION
Plainfield, N. J.

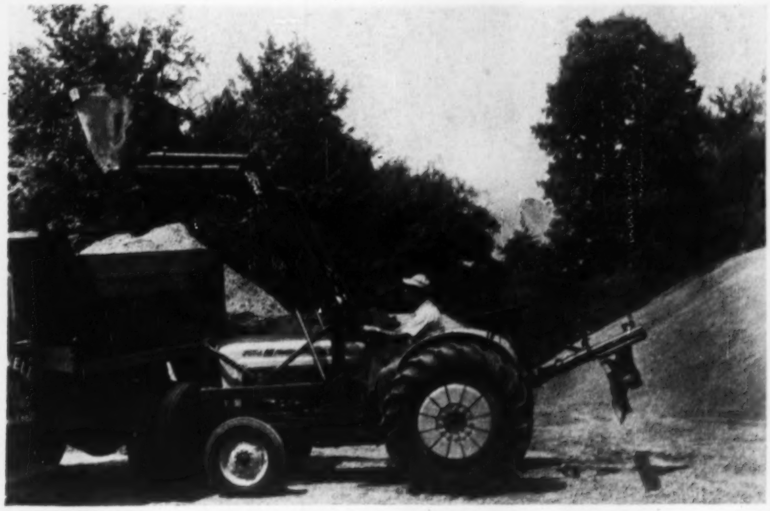


Guard Rail for Bridges, Highways

A deep beam highway and bridge guard rail has been put on the market by Granco Steel Products Company. Made of tough carbon steel, the rail is designed to be a high-strength, visual barrier to protect bridge approaches and to safe-guard highway traffic, particularly on curves and deep fills, according to the manufacturer.

It is said the rail will deflect cars parallel to the roadway since beam-strength and height prevent cars from hurdling over or going under the barrier. Flared end sections help prevent cars from hitting it head on.

Two types are available: Highway guard rail is made of 12 guage steel, and bridge rail is of 10 guage. The rail is corrugated with two convex curves and one concave; corrugations are 3¼ in. deep, and it is designed to fit posts 12½ ft apart. Granco Steel Products Co., 6506 N. Broadway, St. Louis 15, Mo.



Ford Readies Beefed-Up Tractor Line

The most powerful tractors ever built by Ford Motor Co. are included in its new line being introduced across the U.S. on Nov. 15.

A Powermaster class, which includes six models, has a 10% boost in horsepower over the largest tractors previously made by Ford. The Workmaster line of tractors, also comprising six models, has an engine developing 8% greater power than its previous counterpart.

In addition to power, the tractors feature brighter headlights for night operations, higher gas tank capacities, improved fender design, grille and color changes, and restyled instrument panels with an electric fuel level indicator and generator warning light replacing the conventional ammeter.

The Workmaster name has been given to Ford tractors with the short-stroke 134 cu in. engine. Five models in the "601" series of utility and all-purpose tractors and one model of "701" series row-crop tractor carry this new designation.

The modern-design low-friction 172 cu in. engine is used in the six Powermaster models, four of which are series "801" utility and all-purpose models and two are Series "901" row-crop types.

Standard fuel for the 12 models is gasoline, with factory-installed liquefied petroleum (LP) gas engine, in both sizes, available as options.

New in the instrument cluster is an electric fuel gage that gives an instant reading of the fuel level. The "Proofmeter" showing engine, tractor, and power take-off speeds, and hours of operation is standard equipment on all except utility models.

To increase the operating range, larger capacity fuel tanks, holding 17 gal for the Powermaster and 13 gal for the Workmaster, are installed beneath the hoods.

Two transmissions—a four speed and a five speed—are offered. Available for factory-installation with the four-speed transmission is an auxiliary over-and-under transmission option to give industrial users the precise control of twelve forward and three reverse speed ranges.

Power steering is available as an option in the utility and all purpose Series "601" and "801" models. Tractor and Implement Division, Ford Motor Co., Birmingham, Mich.

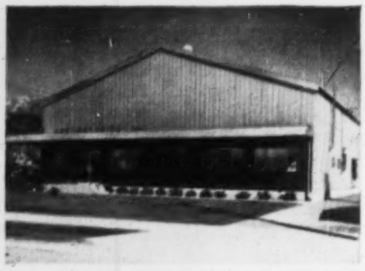
New Japanese Transit Now Available in the U. S.

A Japanese transit called the Eagle, having a stadia arc, reversion telescope dial, and a ribbed horizontal plate now is on the market in the U. S.

Two models are available—one with 20 second graduations at $480 and the other with 1 minute graduations at $459. Texas-Asiatic Import Co., 2127 Ft. Worth Ave., Dallas, Tex.

(New *Products continued on page* 86)

Can a metal building be a better place to work?



Offices, factories, retail outlets, warehouses—simply or beautifully architect-styled—build it any way with the Butler Building System. Get good buildings for less.

Yes, if it's a
Butler
pre-engineered building

Fresh air, proper light and temperature control are three vital keys to good employee morale. Lack of any one creates irritability, nervous strain and absenteeism. And the design and construction of the building is often the cause.

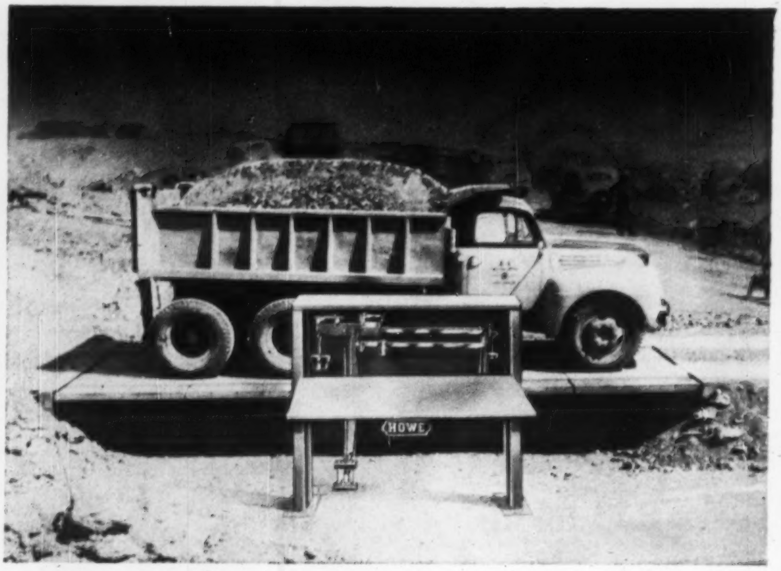
These three keys to healthful working conditions are a bonus you'll find built into Butler pre-engineered metal buildings. Low-cost plastic Lite*Panls in the roof flood the interior with natural, non-glare light, eliminating eye fatiguing contrasts overhead. The gable roof makes a naturally self-ventilating building . . . no trapped foul-air strata . . . no dead air pockets. And the Butler method of vapor-sealed wall insulation reduces temperature contrasts from wall to room —contrasts that produce damp, chilly floor drafts. These are only a few of the advantages you get in a Butler— the lowest cost way to build well. Call your nearest Butler Builder for all the facts. He's listed in the Yellow Pages under "Buildings" or "Steel Buildings." Or write direct.

BUTLER STEEL PRODUCTS

BUTLER MANUFACTURING COMPANY
7418 East 13th Street, Kansas City 26, Missouri

Manufacturers of Buildings • Oil Equipment
Farm Equipment • Dry Cleaners Equipment
Outdoor Advertising Equipment
Custom Fabrication

Sales offices in Los Angeles and Richmond, Calif. Houston, Tex. • Birmingham, Ala. • Atlanta, Ga. Minneapolis, Minn. • Chicago, Ill. • Detroit, Mich. Cleveland, Ohio • New York City & Syracuse, N. Y. Washington, D.C. • Burlington, Ontario, Canada

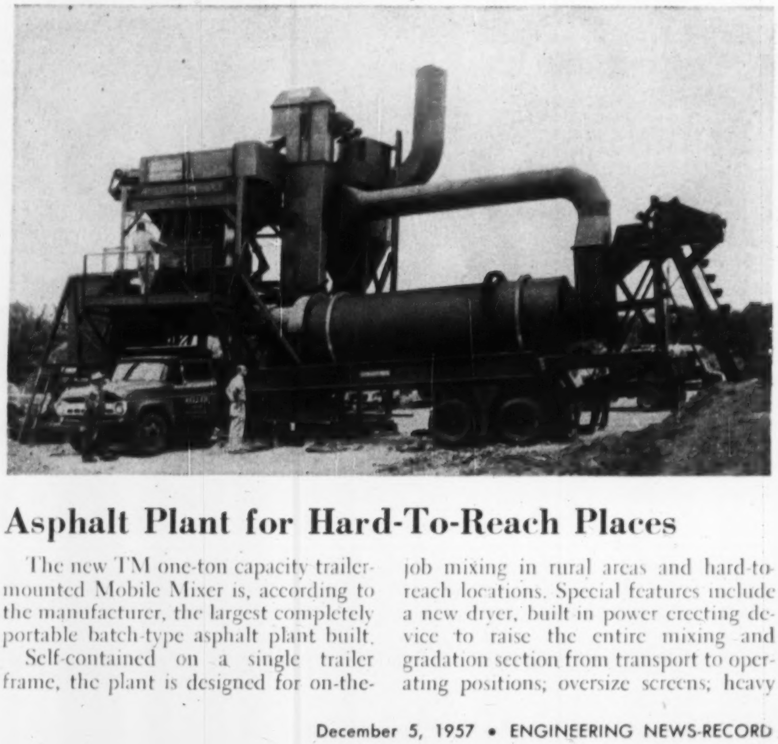


No Pit Is Needed for This Portable Scale

Portable vehicle scales in capacity to 70 tons and lengths to 60 ft now are available. Additional scale sections can be joined for greater length and capacity—in an operation that requires 9 standard bolts.

According to the manufacturer, these scales require no pit, a feature which permits the scale to be relocated as the job requires.

The units incorporate the parallel link load suspension assembly in their platform construction, designed to absorb loading shocks and reduce wear on the scale pivots. Howe Scale Co., Rutland, Vt.

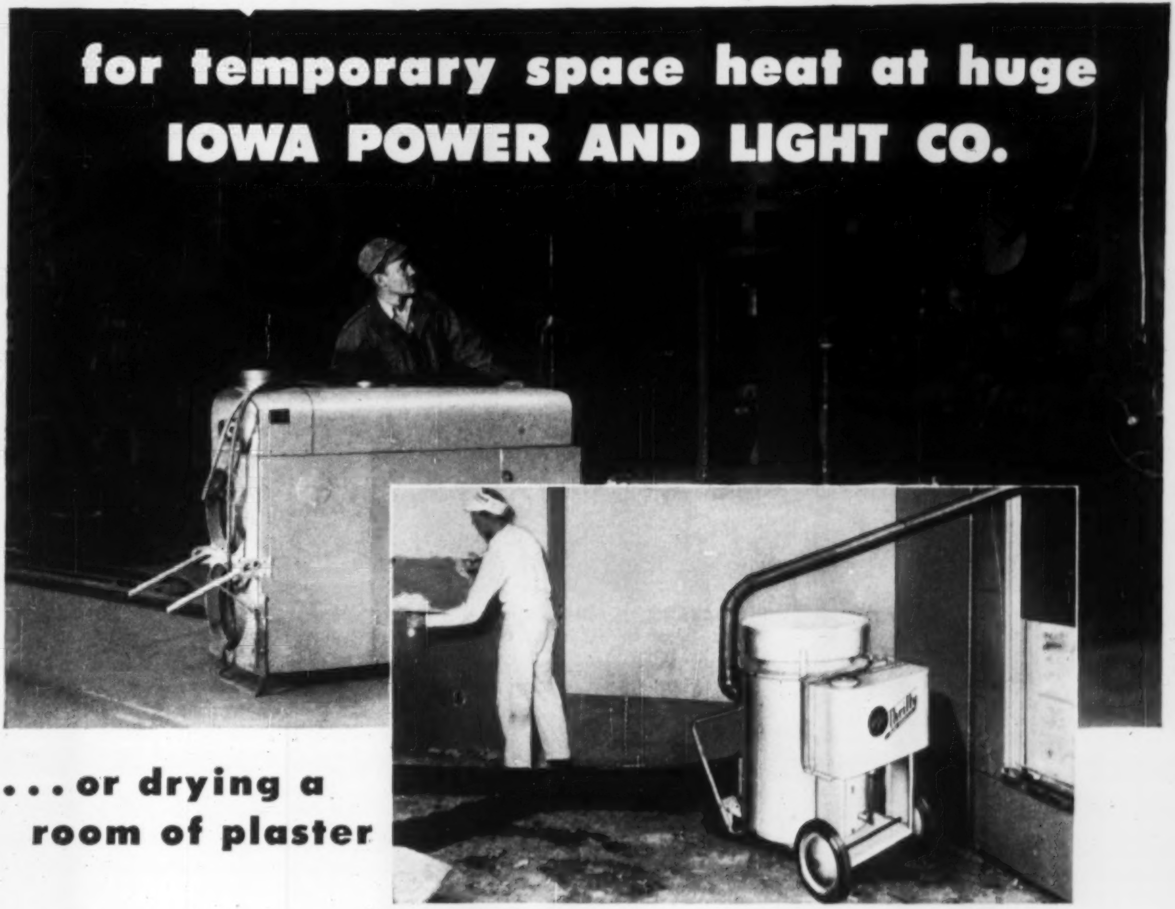


Asphalt Plant for Hard-To-Reach Places

The new TM one-ton capacity trailer-mounted Mobile Mixer is, according to the manufacturer, the largest completely portable batch-type asphalt plant built.

Self-contained on a single trailer frame, the plant is designed for on-the-job mixing in rural areas and hard-to-reach locations. Special features include a new dryer, built in power erecting device to raise the entire mixing and gradation section from transport to operating positions; oversize screens; heavy

for temporary space heat at huge
IOWA POWER AND LIGHT CO.



. . . or drying a room of plaster

count on . . .

HERMAN NELSON PORTABLE AIR HEATERS

everybody else does!

Building a new Power Station in mid-winter called for *safe* portable heat . . . so they chose Herman Nelson Portable Heaters! Whatever *your* winter job, in building or maintenance, get the same dependability with Herman Nelson. No other portable heaters give you such safety, ease of operation and trouble-free performance. Choose the fully automatic "De Luxe" . . . the "Utility" with interchangeable power plants . . . or the low-priced "Thrifty". You can buy or rent Herman Nelson Portable Heaters for every job need. See your dealer now!

Get free weather forecast service . . . Mail Coupon TODAY

AMERICAN AIR FILTER COMPANY, INC.
Portable Products Dept. 211 • Louisville 8, Kentucky

Rush me complete literature on portable heaters. Also send your monthly Weather Forecast Chart, at no cost or obligation to me.

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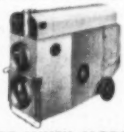
COMPANY ______________________

ADDRESS ______________________

CITY ____________ ZONE ____ STATE ____________

"UTILITY" MODEL

Interchangeable power plants—gasoline engine or electric motor. Gasoline or oil fired. Up to 425,000 BTU capacity.



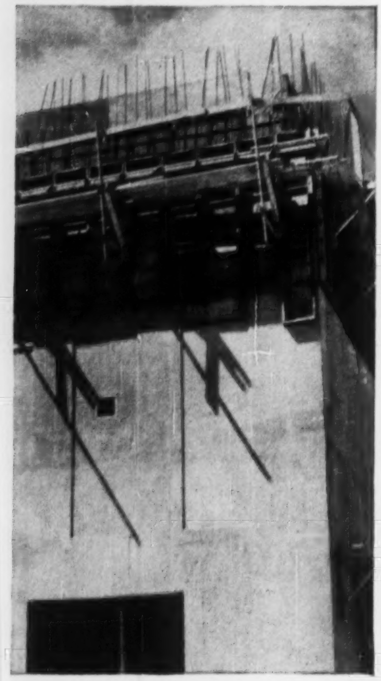
"DE LUXE" MODEL

Oil fired. Electric motor powered. Up to 450,000 BTU capacity. Completely automatic operation.

"THRIFTY" MODEL

Oil fired. Electric motor powered. Up to 165,000 BTU capacity. Low price!

Symons FIELD REPORT...



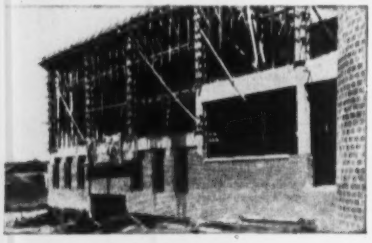
Walls, Slabs, Beams and Stairways Formed with SYMONS FORMS

8,500 square feet of Symons Forms with steel cross members, 200 column clamps and 520 shores were used by Sullivan Long and Hagerty, Birmingham, Alabama, for construction of the new $6,000,000 Jefferson County (Birmingham), Alabama, sewage treatment plant, vacuum filtration and flash drying building, and six digester tanks. The bin section of the plant is 60 feet high.

Forms were leap-frogged for successive lifts on the walls. Large pieces of plywood were attached to the face of the forms to form the recesses on the bin. Forms were also used for forming slabs, beams and stairways. Slab thickness ranged from five to seven inches and Symons 8-foot shores with 8-foot extensions on four foot centers were used to hold the slabs 23 feet high.

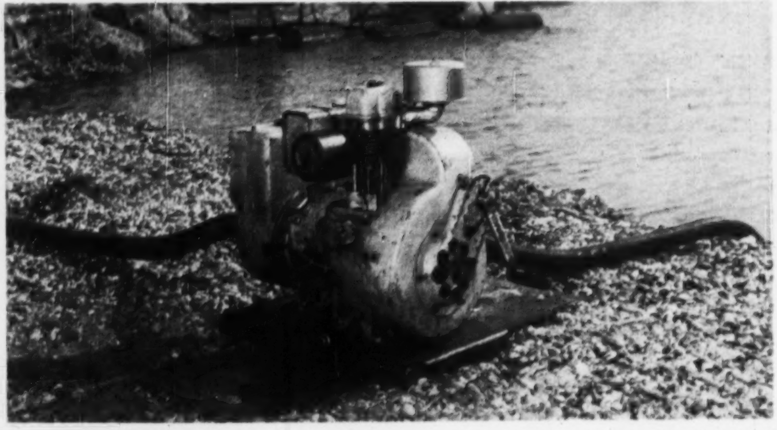
Symons Forms may be rented with purchase option. Symons Clamp & Mfg. Co., 4265 Diversey Avenue, Dept. M-7, Chicago 39, Illinois.

Sewage treatment plant has capacity of 40,000,000 gallons daily and serves an area of 610,000 population. Goodwin Engineering Co., Birmingham, was architect and engineer.

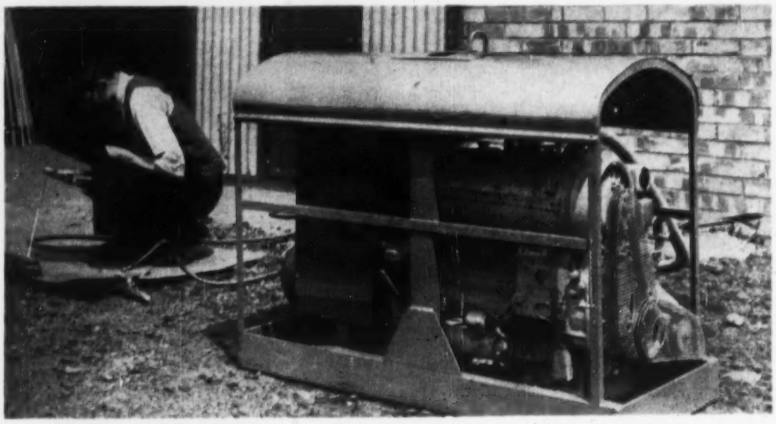


For More Information on
FORMS—CLAMPS—SHORES
Write for Literature.

duty jacketed mixers; positive weight control with aggregate weigh hopper and asphalt bucket suspended on springless dial scales; and simplified controls to reduce operator fatigue. The plant is available in ½ ton and ¾ ton capacities also. STANDARD STEEL CORP., 5001 S. BOYLE AVE., LOS ANGELES 58, CALIF.



SMALLEST of the new series is the 6¼ hp Petter PC 1 single cylinder aircooled diesel engine shown driving a self priming centrifugal pump. Total engine weight is 243 lb.



LARGEST of the new series is the 25 hp Petter PC 4 four cylinder aircooled diesel engine. A 30 volt, 200 amp welding set is powered by this 503 lb engine.

Lightweight Diesel Now Available

A high speed, lightweight diesel, which is said to make economical diesel power available for the first time for small agricultural, marine and industrial equipment, is being introduced to the U.S. market. The diesel engines, designated the PC series, range in weight from 243 lb for the single cylinder PC1, to 503 lb for the four-cylinder PC4.

All models in the new series operate at a constant speed of 3,000 rpm, more than 1,000 rpm faster than comparable diesels.

In Great Britain, according to the manufacturer, the Petters PC engines already have supplanted gasoline engines on various types of industrial and agricultural equipment.

Earlier diesels were unsuited to light usage, mainly because of their low power-to-weight ratios. The new series is believed to have overcome that problem to such an extent that the new engines are already in use as power sources for small alternators, cement mixers, centrifugal pumps, fork lift trucks, dumpers, and the like.

The new series also will appear soon as power plants for air compressors, generators, cranes, conveyors, and ventilating and refrigeration units.

Petters Limited, manufacturer of the new PC series, is a member of the Brush Group Ltd., one of the world's largest producers of diesel-electric plants. The new engines are being distributed in the U.S. through Brush ABOE, Inc., Woodside, N. Y.

DIG . . . TRAVEL *Anywhere* with a fast, mobile LORAIN SP-107

DRAGLINE — Here a Lorain SP-107 with a $\frac{3}{8}$-yd. dragline bucket mucks out channel bottom $\frac{1}{2}$ mile from road.

Here's a new contractors' excavating tool with rubber-tire travel speed to get it where it's wanted—fast . . . yet, with the tractive effort, flotation and power usually associated only with crawler machines.

Whether for "handy-andy" use on big construction projects . . . or as the prime excavator on a residential basement, the agile, high-speed, $\frac{3}{8}$-yd. Lorain SP-107 is designed to be a profit-making contractors' tool.

Take it where the jobs are, over city streets, highways or cross-country where the going can be rough. Move it in and go to work and see what this "powerhouse" can do for you. Here are some additional features of the "107" you'll want to know about:

- Torque converter power take-off gives it lots of hang on . . . won't give up on the tough jobs.
- With 3 or 6 travel speeds — up to 15 m.p.h. — the Lorain SP-107 is fast from job to job . . fast around the job.
- The 4-wheel drive — and big tires take it easily over soft, rough ground.
- No outriggers needed . . . no fuss, no bother, no lost time . . . move in and go to work.
- Power steering and power brakes make the Lorain SP-107 easy, simple to handle.
- Hydraulic control of all clutches . . . the Lorain SP-107 is easy and fast to operate.

Your Thew-Lorain Distributor can show you how the Lorain SP-107 can be quickly converted for any kind of contractor's use. See him for details soon.

THE THEW SHOVEL CO., LORAIN, OHIO

HOE — This Lorain SP-107 hoe is digging a sewer trench through tough blue and yellow clay.

SHOVEL — The Lorain SP-107 is easily converted to a $\frac{3}{8}$-yd. shovel.

THEW LORAIN®

Pump Liquid

WASTE

with the

weil

Heavy duty

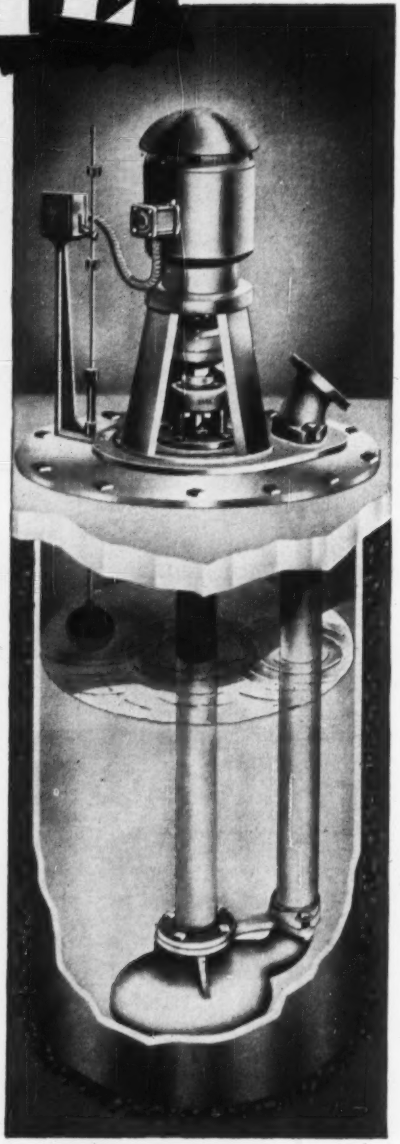
Sewage Ejector

The Weil screenless sewage ejector with the NON-CLOG impeller effectively handles large diameter solids, rags and stringy material of various lengths which are washed into the sewage pit.

RUGGEDLY BUILT: This factory assembled unit has an ample reserve of strength to meet the most severe conditions and furnish years of trouble free operation.

SIMPLIFIED PIPING: Only one piping connection required. An economical installation.

The **NON-CLOG** Impeller (illustrated below) built into the WEIL Screenless Sewage Pump supplies the ideal method of pumping sewage and unscreened liquids containing solids.



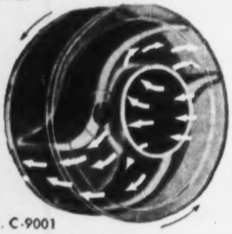


Fig. C-9001

Successfully handles the tough jobs where other pumps fail.

Send for Bulletin C-900 E. Weil Representatives and Weil Engineers are available to help solve your waste pumping problems.

See Catalog in 1957 Sweet's and 1957 Domestic Eng. Cat. Dir.

weil PUMP CO.

1528 No. Fremont St. Chicago 22, Illinois

Publications

Welding—"How to Get Better Welds," a revised edition of Welders' Vest Pocket Guide, contains 60 pages of arc welding information. HOBART BROTHERS CO., TROY, OHIO.

Payscrapers—A 16 page catalogue answers most questions as to why International Harvester feels its Models 75 and 55 Payscraper Units are good investments in the self-propelled, rubber-tired earthmover field. Photos, diagrams, cutaways and other visual means tell the story. BOOKLET CR-644-G, INTERNATIONAL HARVESTER CO., 180 N. MICHIGAN AVE., CHICAGO 1, ILL.

Compactor—How to reduce equipment costs by using only one machine to do all types of fill and base compaction, seal coating, and surface-rolling is covered in "Compact Facts about the New and Revolutionary System of Duo-Paction." SEAMAN-GUNNISON CORP., 2763 S. 27TH ST., MILWAUKEE 15, WIS.

Crawler tractor—The International TD-9 crawler tractor, equipped with sideboom and blade backfilling rig is the subject of a new 8 page, two-color booklet now available. BOOKLET CR-640-G, INTERNATIONAL HARVESTER CO., 180 N. MICHIGAN AVE., CHICAGO 1, ILL.

Concrete carriers—A brochure describes Oshkosh four-wheel drive and six-wheel drive concrete carriers. Photographs illustrate how the traction of the carrier spots concrete where it is wanted despite adverse operating conditions of weather, off-highway hauling and congested traffic. Detailed specifications are shown. DEPARTMENT CC, OSHKOSH MOTOR TRUCK, INC., OSHKOSH, WIS.

Industrial installations—A brochure describing and illustrating its services has been published by Commercial Contracting Corp., Detroit. The 16 page booklet includes sections devoted to press erecting, rolling mill installations, machinery installations and moving, foundry and overhead crane installations and mothballing. The brochure also refers to specific programs that have been carried out and lists nationally known customers. COMMERCIAL CONTRACTING CORP., 12160 CLOVERDALE, DETROIT 4, MICH.

Power shovel—A bulletin gives full specifications and detailed photographs of the FB-80. The unit is available in 90 or 100 hp. diesel or electric powered. ING. F. FIORENTI & CO., VIA LEONIDA BISSOLATI, 76, ROME, ITALY.

How prompt payments will help cut highway costs

When a contractor bids the big jobs coming up on the Interstate Highway program, he must take into consideration the cost of financing. This is true whether he has ample capital or whether he must borrow funds to finance his expenses. He must include in his bid present high interest rates on all his costs caused by deferred work payments. He must allow for this interest burden for all the months until completed work and authorized payments can catch up with his accumulated job costs. Not only does his problem of financing include the actual cost of producing the unit-pay items, but it also includes:

- Cost of pre-survey of job site, study of blue prints, job planning, estimating, and bidding.
- Cost of his performance bond, and all his job insurance policies.
- Cost of staffing for the job ahead.
- Cost of special equipment needed to fit job requirements.
- Cost of modernizing his equipment fleet to obtain lowest cost of work in place.
- Move-in costs including offices, shops and housing.
- Cost of job-supply inventory . . . repair parts, fuel, oil, tires, as well as stockpiles of aggregates, cement, steel, etc.
- Initial make-ready work on haul roads, drainage, etc., prior to start of paid production.
- Financing cost of payroll and job supplies, not only prior to initial payments, but until current payments accumulate enough surplus to repay the initial job investment.

In many states, "hold-back" provisions intended to protect the government investment in contract payments have been built up and added to over the early years when we had smaller jobs and contractors with limited capital and small investment in equipment. The theory was to make "assurance doubly sure". As our jobs became larger, more highly mechanized, and required a tremendous increase in a contractor's initial expense and financial responsibility, these well intentioned, multiple safeguards have, in many states, been retained at an added cost in bid prices far beyond their need or worth to the contracting agency.

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Damages for Defects

Court rules contractor must pay for correction

Two formulas are in general use for computing the damages an owner may recover from a contractor for defective performance of a contract. One is the difference between the value of the building as constructed and the value it would have had if constructed according to the terms of the contract. The other is the cost of remedying the defects.

A comprehensive discussion of both rules appears in a New York case, where an owner ended up with a driveway too steep for use because the contractor, in building the house, encountered rock and failed to excavate it.

When the owner sued the contractor, he asked as damages the fair and reasonable cost of making the driveway usable. The contractor contended that all the owner was entitled to was the difference in the value of the house as constructed and its value had the contract been followed, or the cost of correcting the defect, whichever is the lesser. In instructing the jury, the trial court followed the owner's contention. The contractor appealed, and the Appellate Division reversed the judgment and directed a new trial.

The owner then appealed to the Court of Appeals, and that court reversed the Appellate Division and directed that the judgment of the trial court be reinstated. The Court of Appeals stated: "The Appellate Division adopted the defendant's (contractor's) contention largely in reliance on Jacob & Youngs v. Kent, 230 N.Y. 239, 244, 129 N.E. 889, 891, 23 A.L.R. 1429. In that case, we had applied the 'difference in value' rule simply because the proof failed to show substantial damage or loss in value, since the wrought iron galvanized pipe, as furnished, was substantially the same in quality, weight, market price, serviceability and appearance as pipe of 'Reading' manufacture called for in the contract specifications and that the cost of replacing the same with the 'Reading' pipe as specified 'would be great, but the difference in value . . . would be either nominal or nothing;' in other words, replacement of the pipe, under the circumstances of that case, would have constituted economic waste.

"However, this litigation poses an entirely different kind of breach, the consequence of which is to burden plaintiff (owner) with an unusable, unsafe and unsightly driveway. While it is unfortunate that the defendant elected to build the garage at an unsuitable elevation in order to avoid the cost of excavating unforeseen rock and to correct that defect will now cost much more than initially, nonetheless, that loss should not fall on the innocent owner whose protests made at the time were put off by the president of the defendant corporation, with assurances not to worry, that when finished the grade would not exceed 10% and that the plaintiff would be happy when he got into his home.

"The 'difference in value' rule in defective performance of construction contracts seems to be applied only when it would be unfair to apply the general rule (of. Jacob & Youngs v. Kent, supra). In a case such as the present when 'the variance is so substantial as to render the finished building partially unusable and unsafe, the measure of damages is 'the market price of completing or correcting the performance.' 5 Williston on Contracts, Rev Ed., Section 3825; 2 Sedgwick on Damages, 9th Ed., Section 644, page 1293; 1 Restatement, Contracts, Section 346, subd. 1, par. (a).

(1) Bellizzi v. Huntley Estates, 3 N.Y. 2d 112, 143 N. E. 2d 802, Court of Appeals of New York, July 3, 1957.

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Editor's Note: This case gives an unusually full statement of resources of law involved in determining damages recoverable for defective performance.

Liability of Surety

Court noted distinction between performance and material payment bonds

Can a supplier of labor and materials recover against the contractor's surety under a performance bond? Because of the legal distinctions between a performance bond and a labor and material payment bond, the answer depends on the language of the bond and the intention of the parties.

A comprehensive discussion of the law appears in a recent District of Columbia case in which the contractor had furnished an indemnity bond containing this clause: "That if the principal (the contractor) shall indemnify the obligee (the owners) against any loss or damage directly arising by reason of the failure of the principal faithfully to perform said contract, then this ob-

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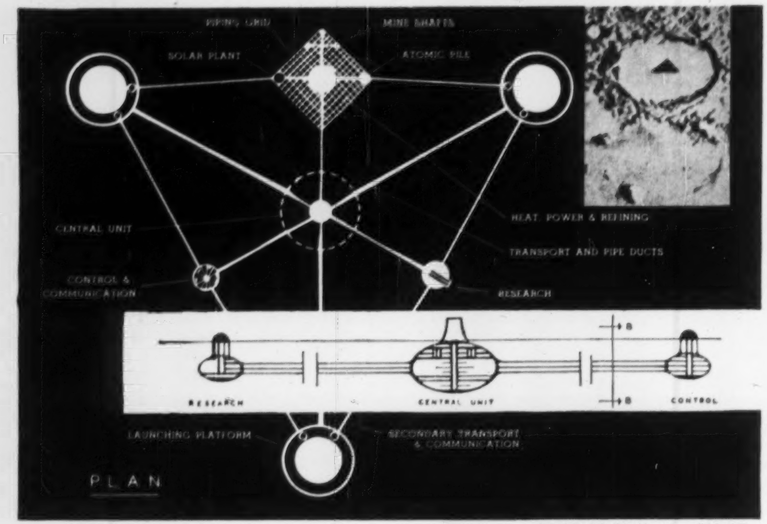

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ligation shall be void; otherwise it shall remain in full force and effect."

A supplier of labor and materials sought recovery against the surety. The trial court ruled in favor of the surety, and the judgment was affirmed on appeal. The appellate court stated: "Appellants (suppliers of labor and material) argue that although the undertaking of the surety was in form an indemnity bond for the owners alone, it should be construed in connection with the contract to which it referred and that when so construed there is evidenced a clear intention that the bond was given for the protection not only of the owners but also for the laborers, materialmen and subcontractors.

"The contract provided for delivery by the contractor to the owners of 'a performance and material and supplies and labor payment bond,' securing the owners' the performance of this agreement and the payment of material and labor. Another part of the contract provided: 'Wherever in this agreement required by the contract, and should promptly make payment to all persons supplying labor and materials in the prosecution of the work contemplated by the contract.' It was held that under the circumstances of that case there was no indication that the bond was intended for the benefit of anyone other than the obligee, especially in view of the fact that the penal sum named in the bond was only one-half of the total contract price.' (See Bruckner-Mitchell v. Sun Indemnity Co. of New York, 65 App. D. C. 178, 189).

"While many recent cases tend to find intention to benefit materialmen and subcontractors in performance bonds and payment bonds, or a combination of the two, we have found no case holding that such parties may sue on a strict indemnity bond, as is the bond in this case. A surety's obligation must be measured by the condition stated in the bond, and when the condition is, as here, merely to indemnify the owner against loss or damage by reason of the failure of the contractor to perform, such condition cannot be construed to go further than its terms and give rights to others not mentioned either expressly or by intendment. In the annotation at 77 A.L.R. 21-214, in summarizing the holdings of many cases, the annotator concludes:

"'Where the bond is conditioned merely to indemnify and hold harmless the owner or public body, it seems, both by authority and reason, that it does not inure to the benefit of laborers and materialmen so as to enable them to recover thereon.'

"A recent case in our neighboring

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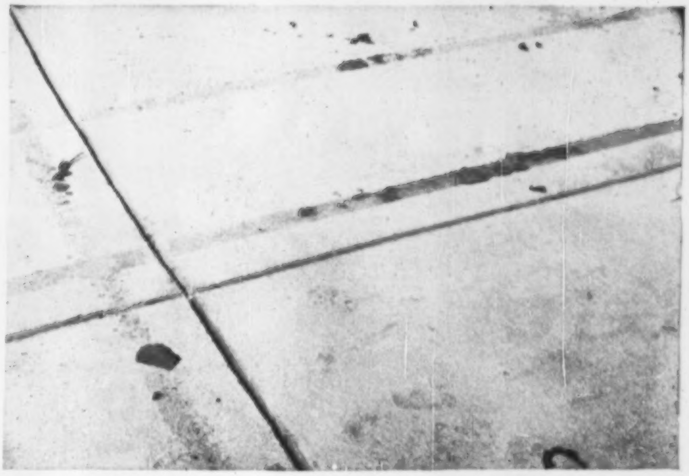

FIGURE 1

. . . uses KORK-PAK® as dummy joint filler; removes filler after concrete cure by sawing

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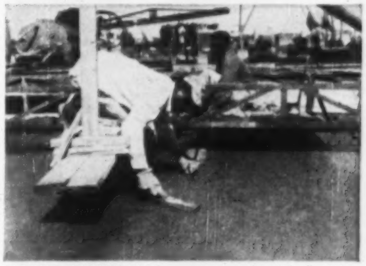
KORK-PAK DUMMY JOINT is embedded in concrete. *Figure 2*

KORK-PAK is a composition of asphalt and granulated cork, formed between two sheets of asphalt saturated paper. It is non-extruding and is readily handled without breakage. It is a general purpose joint filler widely used on highway and turnpike projects. The KORK-PAK material was easily sawed out and did not gum up the blade, as did other types of asphalt and hard-board joints.



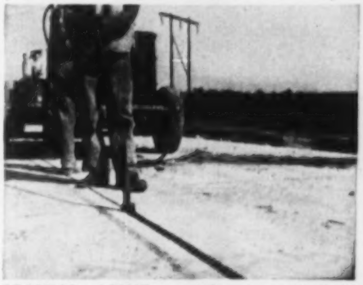
HAND FINISHING over embedded joint produces smooth surface. *Figure 3*

Essentially, the new technique consists of embedding ¼" wide x 2" high lengths of the KORK-PAK in transverse and longitudinal joints at the time the concrete is being placed (Fig. 2). Transverse joints were spaced at 31'4" intervals. The small surface sections of concrete disturbed by insertion of the joint were finished by hand. (Fig. 3).

At a convenient time (because cracking was controlled by the dummy joint) the contractor, using a saw with an abrasive blade, quickly and easily removed the top inch of the KORK-PAK (Fig. 4), leaving the other inch undisturbed in the concrete. Sawing the joint when convenient eliminated the necessity of overtime.

AFTER CONCRETE CURES, top 1" of dummy joint is sawed out. *Figure 4*

Using the KORK-PAK dummy joint technique, the contractor reported getting from 2500 to 3000 lineal feet per blade. The ¼" joint obtained was practical to seal and gave the pavement the same riding qualities as one in which the joints were sawed by a diamond blade in the conventional manner.



SEALING JOINT — "Zero-Lastic" Cold-applied material is pumped into joints from container. *Figure 5*

After cleaning the sawed joints, the contractor applied Servicised "Zero-Lastic" Joint Sealing compound (Fig. 5) in the usual manner.

More information and specific details on the material and equipment used on this project are available from Servicised Products Corporation. Write for the Servicised Catalog which contains valuable data and complete details on Servicised Asphalt, Cork and Rubber composition products for the construction industry.

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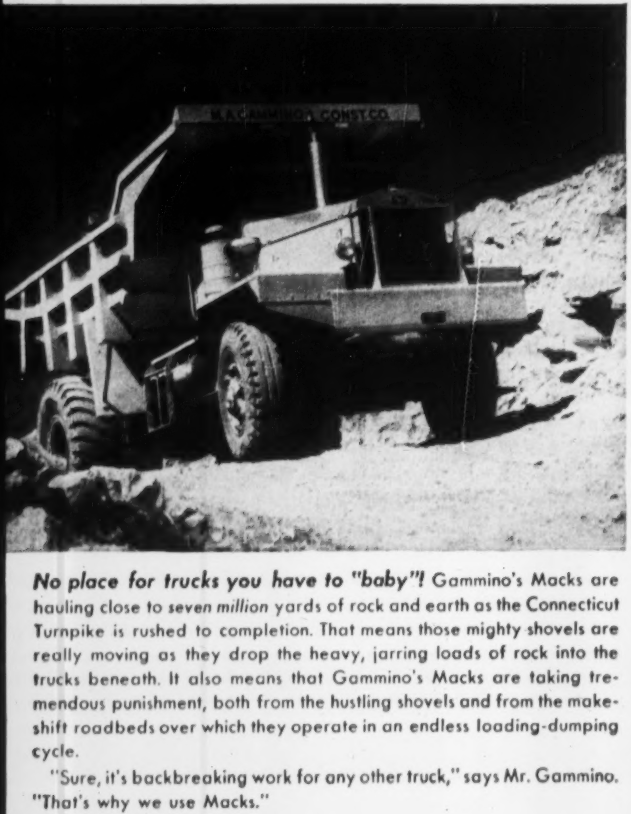

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state of Maryland is very much in point. On facts very similar to those in our case, in denying recovery to a materialman and subcontractor, the court said:

"'It is clear, under these provisions (of the contract), that the owner could have required the principal to furnish a payment bond, and not merely an indemnity bond. But the surety was not obliged to make its undertaking co-extensive with that of the principal. The short answer is, that the bond furnished was not a payment, but merely an indemnity bond. The surety did not agree to be responsible for evervthing that the principal undertook to do, but only for such of his failures as caused loss to the owner.' Board of Education of Montgomery County to Use of Breedon v. Victor N. Judson, Inc., 211 Md. 188, 126 A. 2d 615, 616.'

"Our conclusion is that appellants (labor and materialmen) have no right of recovery on the bond and the trial court correctly granted judgment for the surety."

(1) Revard v. New Amsterdam Casualty Co., 132 A. 2d 157, Municipal Court of Appeals for the District of Columbia, June 5, 1957.

Date of a Contract

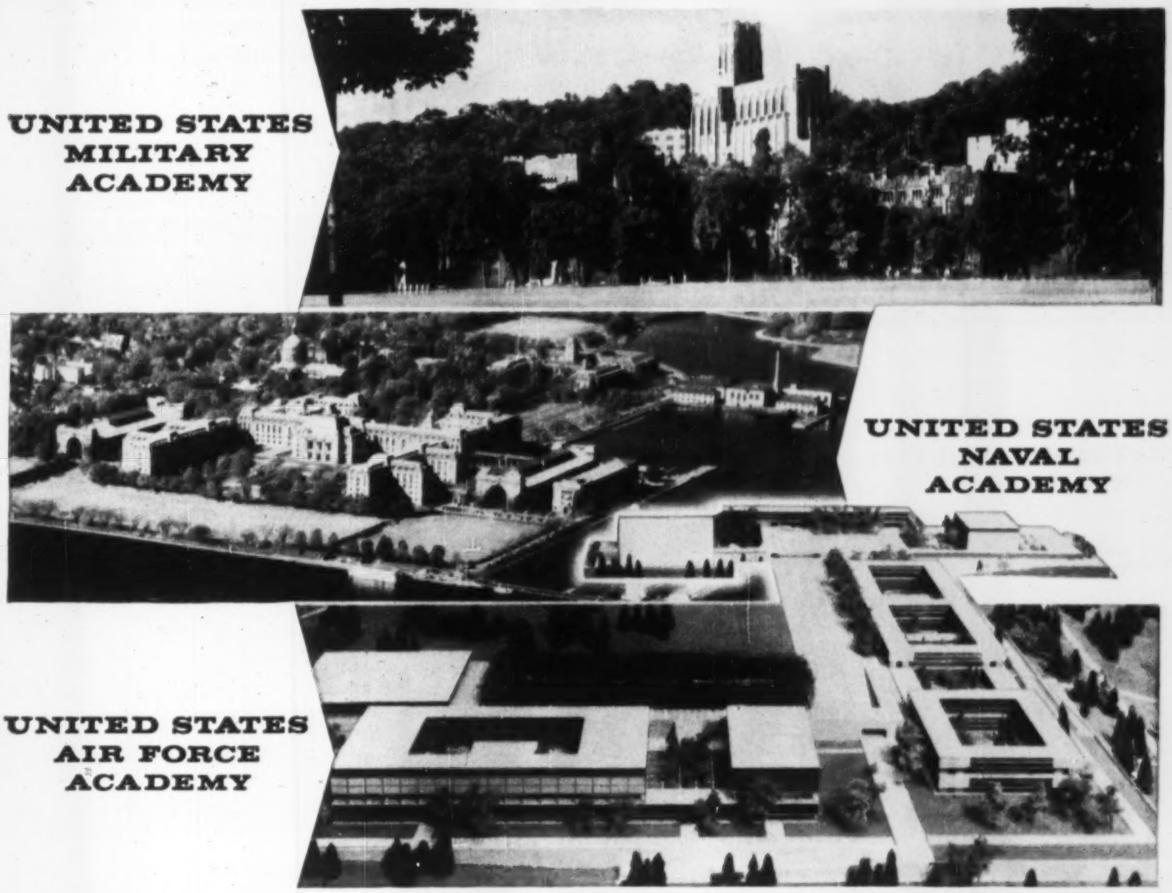
Commencement of work, not contract delivery considered controlling

If the low bidder on a project is informed he has been awarded a contract and, under proper authorization, commences work before the contract is signed or delivered, the completion date, for the purposes of default, is determined according to the commencement date, not the delivery of the contract, where the contractor is given a specified number of days to do the work.

The rule was applied in a New York case in which the facts were these:

The Colon Contracting Corp. was low bidder for the general construction work on a housing project being constructed by the Watertown Housing Authority. The housing authority notified the contractor that it was low bidder and that it had been awarded the contract. The letter accepting the bid was dated Aug. 29, 1950, and the contractor was notified that the date of the commencement of the work was established as of Sept. 1, 1957. The executed contract was not delivered to the contractor until Oct. 23, 1950. The contract required performance of the work within 300 calender days and stated that no payments would be made to the contractor after the 300 day period. The contractor did not complete the work within the contract time and the housing authority stopped making monthly payments, whereupon the contractor stopped work claiming that the refusal to make the monthly payments constituted a breach of the contract and brought an action to recover on the basis of the fair and reasonable value of the work. It claimed that since no valid contract existed until the contract had been signed and delivered, the housing authority was not justified in computing the starting day for performance as of Sept. 1, 1950, when the contract was not signed and delivered until almost two months thereafter. The contractor's suit was dismissed.¹ The dismissal was affirmed by the Appellate Division (2 A.D. 2d 869, 157 N.Y.S. 2d 927) and leave to appeal to the Court of Appeals was denied (3 A.D. 2d 690, 158 N.Y.S. 2d 797).

The Contractor's claim was rejected on the ground that it proceeded with the work before a written contract was entered into without any objection on its part. The referee before whom the case was tried, stated: "In support of its contention of 'no contract, no liability,' plaintiff (Contractor) cites Agostini v. State, 268 App. Div. 1014, 53 N.Y.S. 2d 120; Belmar Contracting Co. v. State of New York, 233 N. Y. 189, 136 N.E. 240; Brown v. Mt. Vernon Housing Authority, 279 App. Div. 794, 109 N.Y.S. 2d 392; Town and Country Engineering Corp. v. State, Ct. Ci., 46 N.Y.S. 2d 792; Price v. Reynolds Metals Co., D.C., 69 F. Supp. 82, 83, 84. These cases apply to the principle followed in the decisional law of this state that, is there is no contract there is no liability. The Watertown Housing Authority being a public corporation, its powers are exercised in accordance with the provisions of the Public Housing Law and it could not be held liable until the contract had been executed by the parties and delivered. Neither is there any obligation requiring a bidder to organize his forces, bring in his equipment and commence operations prior to the execution and delivery of the contract. In none of these cases had the contractor begun work before he had a contract, except in the Brown case, supra, where a contract was never delivered. Nor have I any quarrel with the California case cited by plaintiff, Berkeley Unified School District of Alameda County v. James I. Barnes Const. Co., D.C., 112 F. Supp. 396, 398, which holds there is an exception to the general rule that acceptance by a public body constitutes a binding contract in cases where, as here, the Instructions to Bidders specifies that



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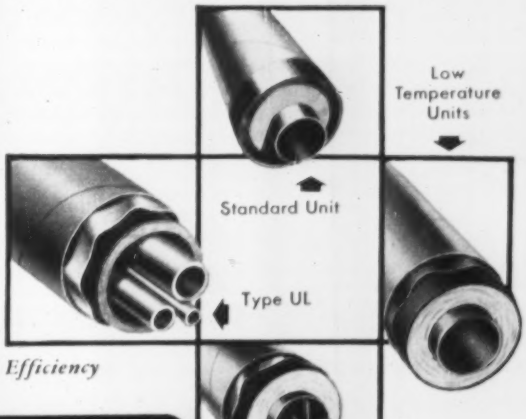

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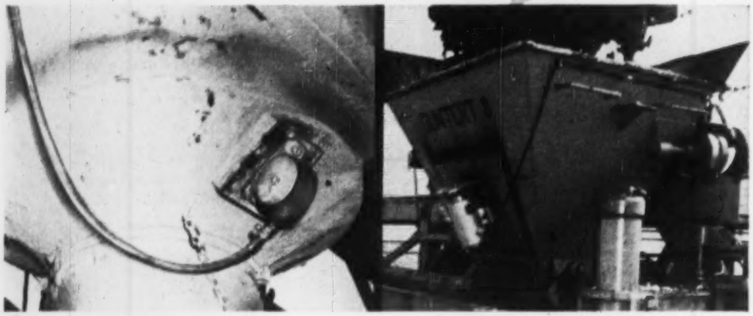

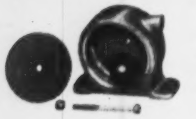

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"But Colon did not stand on delivery, or refuse to proceed prior to receipt of its contract, or voice any protest to the official starting date. Were we called upon in the instant case to determine whether the plaintiff could have recovered under the form of contract for services rendered and materials furnished between Sept. 1 and Oct. 23, had the defendant abandoned the contract or refused to sign, the authorities fully support the proposition that under such circumstances plaintiff could not recover. We are not confronted with such a problem here. The defendant did deliver an executed contract and paid the requisition covering the period from Sept. 1. Regardless of Colon's right to refuse to work previous to delivery of the contract, it did not do so. The record is eloquent that the minds of the parties met as to the date for commencement of work * * * Colon's conduct for almost nine months after it received its contract was geared to Sept. 1 as the date for commencement of the work under the contract."

(1) George Colon Contracting Corp. v. Morrison and others constituting the Watertown Housing Authority, 162 N.Y.S. 2d 841, Supreme Court of Jefferson County, New York, July 13, 1954.

Fraud and Rescission

Prompt action required in rescinding contract on grounds of fraud

One induced by fraud to enter into a contract may rescind the contract, but he loses his right to do so if he fails to act promptly or reaffirms the contract after the fraud is discovered.

In a North Dakota case[1] the right to rescind was denied because the alleged fraud was evident for a year before suit was brought.

The case was considered under a local statute which provides that one who seeks to rescind a contract as a result of fraud must act promptly upon discovering the facts that constitute the basis for rescission. This is the common law rule in all states.

The court stated: "The general rule in North Dakota is that the question whether the rescinding party acted with due promptness is one of law for the court to decide. Fedorenko v. Rudman, N.D., 71 N.W. 2d 332. The diligence or promptness required to rescind upon discovering the facts, under the North Dakota statutes, is the same whether the party attempting to rescind

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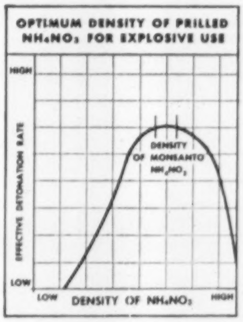

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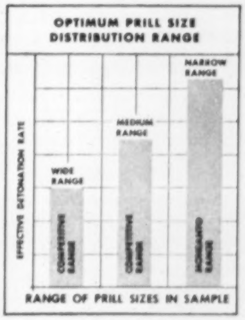

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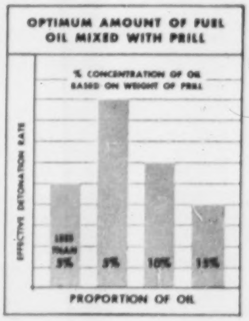

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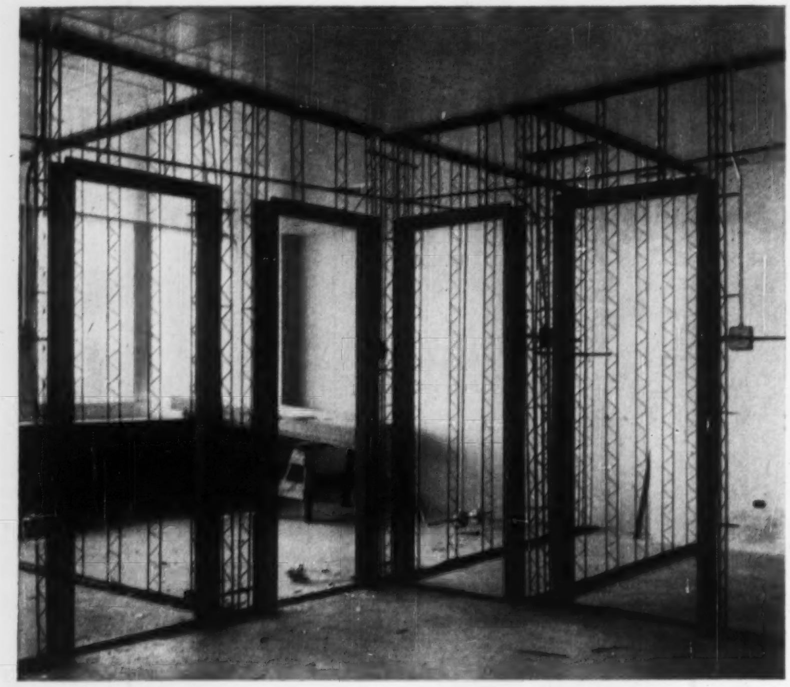
"The Supreme Court of North Dakota, in the Fedorenko case, held that a 16-month delay in taking any formal action, after discovery of the true facts, was inexcusable and operated as a waiver of plaintiffs' right to rescind. Indeed, this same court, in the case of Daniel v. Hamilton, N.D., 61 N.W. 2d 281, held that a delay as short as 66 days was effective in operating as a waiver of plaintiff's right to rescind.

"'Where a party, with knowledge of facts entitled him to rescission of a contract or conveyance, afterward, without fraud or duress, ratified the same, he has no claim to the relief of cancellation. An express ratification is not required in order thus to defeat his remedy; any acts of recognition of the contract as subsisting or any conduct inconsistent with an intention of avoiding it, have the effect of an election to affirm. Indeed, it has been declared that since the remedy of rescission or cancellation is not held in high esteem by the courts even slight circumstances showing a purpose or intent to waive it will preclude the allowance of such relief.' 12 C.J.S., Cancellation of Instruments, Section 28, pp. 996, 997.

"Rescission of a contract, whether the object of a suit in equity or an action at law, is governed by equitable principles. 17 C.J.S., Contracts, Section 413, p. 899."

Quoting from another case, the court said: "It is not possible to make a useful statement of exact rules which determine the situations in which promptness is required and the time within which an election must be made promptly. The following considerations, however, are important. The degree of culpability of the transferee, if any, is of prime importance; less delay will be permitted against an innocent transferee than against one guilty of fraud or duress. * * * The fact that the transferee stood in a fiduciary relationship to the tranferor, or that, by promises, duress, absence from the state, or otherwise, he delayed the transferor in making an election, or that the transferor was ignorant of his legal rights as to rescission, or that one of the parties became ill or died is considered in extending the time within which otherwise an election should reasonably have been made."

Even without any statute, the above rule prevails. In a recent case,[3] the Court of Appeals of Ohio, quoting from a Virginia case,[4] stated: "In order to void a contract for fraud, the fraud must be plainly averred and clearly proved. When established, it renders the contract voidable at the option of the party



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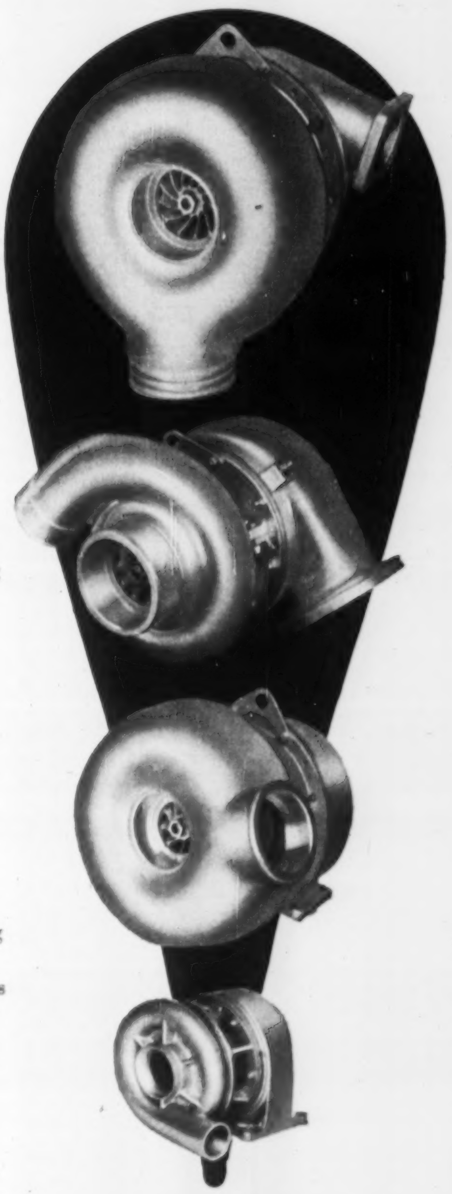

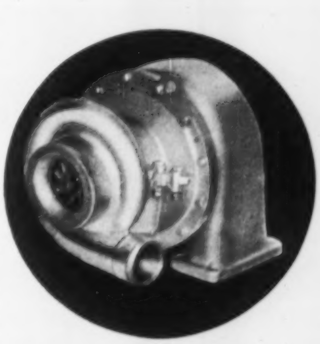

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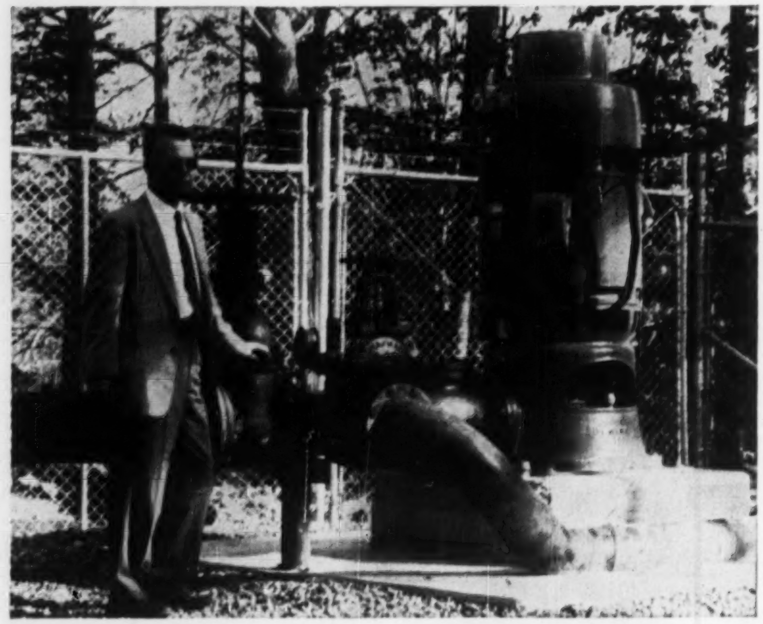

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injured, but his right to disaffirm must be exercised promptly, without unnecessary delay, the time depending upon the circumstances of the particular case.

"The election to abide by a contract which a party might have avoided may be shown by proof of acquiescence in it, and any act which discloses an intention to abide by the contract will be sufficient to ratify it, provided the acquiescience or ratification was with knowledge of the facts which gave the right to repudiate it. Such election, whether manifested by mere acquiescence or by positive acts, when once made, is, as a rule, irrevocable."

(1) Knoshaug v. Pollman, 148 F. Supp. 16, U. S. District Court of North Dakota, Jan. 24, 1957.

(2) Restatement of the Law, Restitution, pp. 250, 251, 252.

(3) Keyerleber v. Euclid Congregation of Jehovah's Witnesses, 143 N.E. 2d 313, Court of Appeals of Ohio, May 31, 1957.

(4) University of Virginia v. Snyder & Co., 100 Va. 567, 43 S.E. 337.

How a Court Determines What a Contract Means

If a controversy arises over the meaning of a contract or its terms, how does a court decide who is right?

A number of guides are in common use. Here are some of the principal ones:

"It is the law that a special provision written into a contract will prevail over the general provisions thereof, Marshall v. Patzman, 81 Ariz. 367, 306 P. 2d 287, and if the written provisions in a contract are inconsistent with the printed provisions, the written matter deliberately added by the parties must prevail, Babbitt Bros. Trading Co. v. Marley, 28 Ariz. 589, 238 P. 392; Restatement of Law of Contracts, Section 236 (c); Corbin on Contracts, Vol. 3, Part. 3, Section 548.",

"The primary object of construction is to give effect to the intention of the parties, greater regard being given to such intent, when clearly revealed, than to the particular words or clauses of the contract, (12 ILP., section 212, page 366; Cedar park Cemetery Ass'n v. Village of Calumet Park, 398 Ill. 324, 75 N.E. 2d 874; Jones & Laughling Steel Co. v. Graham, 273 Ill. 377, 112 N.E. 967,) and we cannot establish a contract different from that expressed in the written agreement. Decatur Lumber and Manufacturing Co. v. Crail, 350 Ill. 319, 183 N.E. 228; Hein v. Shell Oil Co., 315 Ill. App. 297, 42 N.E. 2d 949."[2]

"If there is doubt as to the correct

interpretation of a contract, the practical construction which the parties may give to their agreement is persuasive evidence of their intention."[3]

"It is fundamental that one who executes a contract of a certain character is bound by its terms, even though he meant something different and thought the words conveyed his meaning. A court must give effect to the meaning and intention of the parties as expressed in the language of their contract. In the absence of anything to show legal impediment to prevent their entering into any contract they see fit or for expressing it in the language of their own choice, the rights of the parties must be determined according to the contract."[4]

(1) Wilhorn Builders v. Cortaro, 308 P. 2d 251.
(2) Freeland v. Edwards, 142 N.E. 2d 701.
(3) Hughes v. Thurman, 131 A. 2d 479, 483.
(4) Ebbeskotte v. Tyler, 142 N.E. 2d 905, 908.

Defective Performance And Measure of Damages

As a general rule, the amount of damages an owner can recover for defective construction work is the cost of remedying the defect.

In applying the principle, however, a Connecticut court has refused to enrich the owner by giving him a better bargain than the one for which he contracted.

The case involved a contract for installation of a double flue at an agreed price of $535. While the work was in progress, the owner paid the contractor $200 on account. Thereafter, the owner thought the work was being performed in an unsatisfactory manner and employed another contractor to tear down the work already performed and complete the job for the sum of $350. The original contractor brought an action to recover a balance he claimed was due for the work he had performed. The owner counterclaimed to recover the $200 he had paid.

The trial court granted the owner a judgment for $200, but this judgment was modified on appeal by reducing the judgment to $15, which was the amount the owner had to expend in excess of the original contract price.[1]

(1) Bruni v. Bahnke, 128 2d 543, Supreme Court of Errors of Connecticut, Dec. 27, 1956.

These summaries of court decisions are prepared by I. Vernon Werbin, New York attorney and civil engineer.

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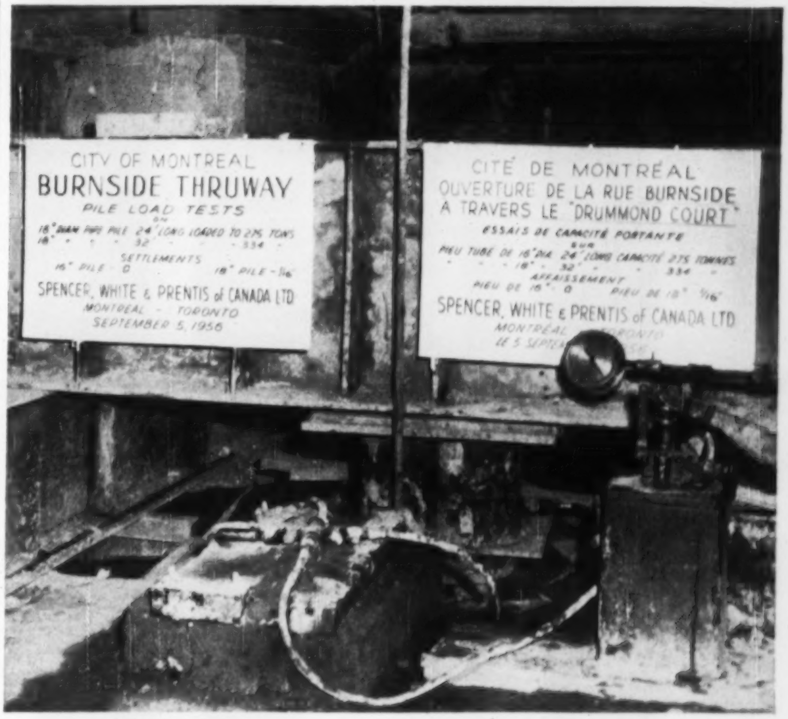
NOTEWORTHY LOAD TEST IN COMPLEX PILE-DRIVING JOB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PILE LOAD TESTS
ON
16" DIAM PIPE PILE 24' LONG LOADED TO 275 TONS
18" " " " 32' " " " 334 "
SETTLEMENTS
16" PILE - 0
18" PILE - 1/16
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PIEU TUBE DE 16" DIA 24' LONG CAPACITÉ 275 TONNES
" " " 18" " 32' " " 334 "
AFFAISSEMENT
PIEU DE 16" 0
PIEU DE 18" 1/16"
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Net settlement, 16-inch pile—0"
Net settlement, 18-in. pile—1/16"

Though these particular results are exceptional, they do come out of a general background of *consistently* high standards in complex pile-driving work.

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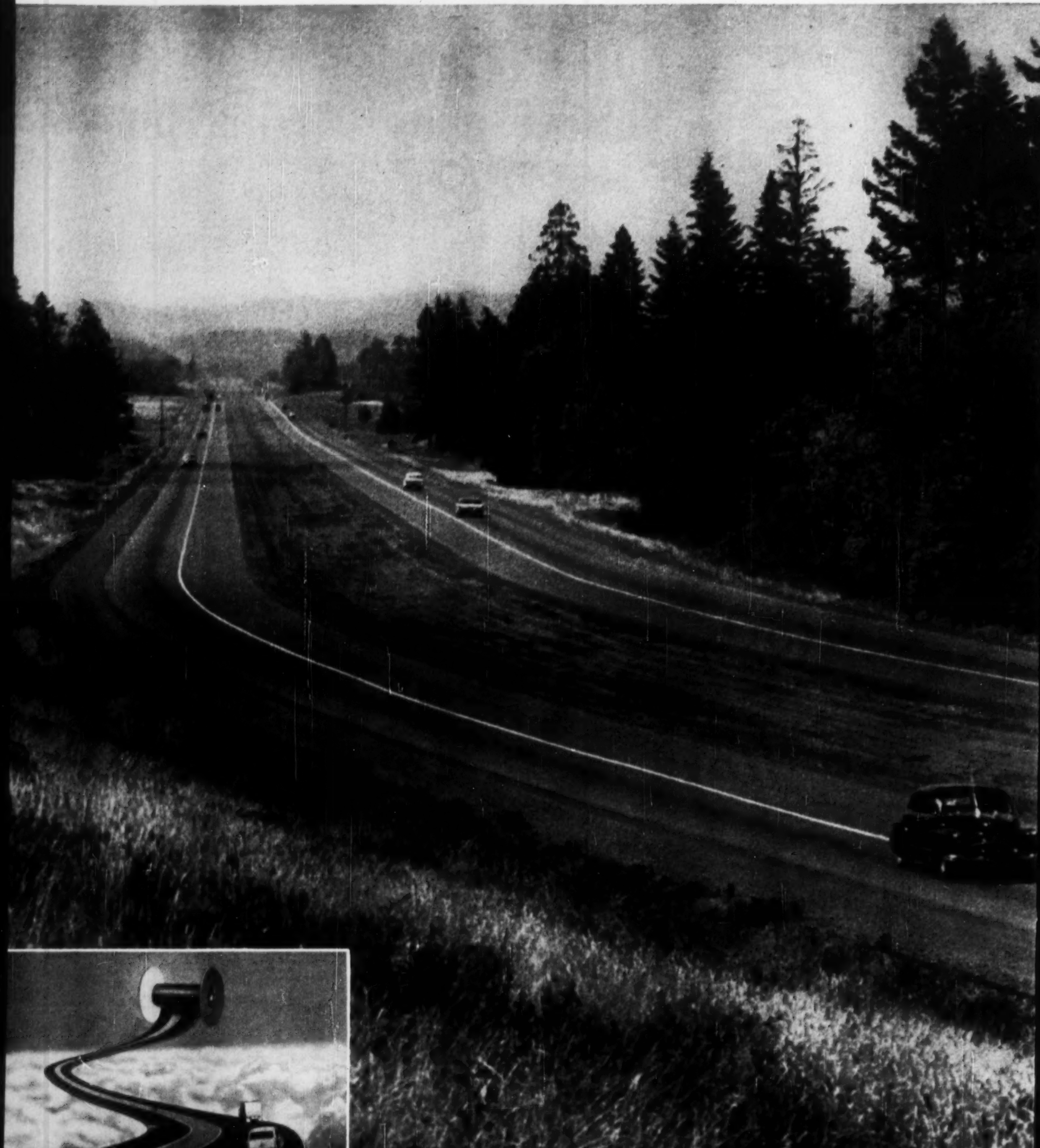
Rugged ASPHALT paving saves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By so doing it saved thousands of dollars in initial costs alone. The entire paving cost for 12.7 miles was $826,978 . . . with savings of $30,000 a mile compared with a connecting slab-paved section. *And more savings are to come . . . for Washington's records indicate that Asphalt pavements cost less to maintain.*

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At 88, Frank Lloyd Wright still has a . . .

Career On the Upgrade

Now 88 and admittedly as arrogant as ever, Frank Lloyd Wright is still shattering the conventions of architecture after a lifetime of it.

The Wright-designed Guggenheim Museum (see also page 42), with a helical concrete floor instead of flat decks, is now spiraling up on New York's Fifth Ave. A new Wright skyscraper—19 story Price Tower—dominates without competition a prairie landscape in Bartlesville, Okla., population 32,000. Last year, the white-haired individualist startled the architectural community with a proposal, including sketches, for a mile-high office building for Chicago.

• More respect today—The derision and indignation with which some professionals used to greet Wright jobs is missing nowadays—or at least muted. The attitude of most of his brother architects has about-faced in the last 30 or 40 years. Even if they still don't quite understand him or agree with him, they do respect him. Scarcely one hasn't been swayed, directly or indirectly, by his impact on architecture. When the American Institute of Architects awarded him its gold medal in 1949, the citation said that he "has moved men's minds . . . kindled men's hearts . . . was and is a titanic force."

Quite different were the sentiments of an AIA delegation passing through Tokyo in the early twenties. Mr. Wright chuckled as he recalled to ENR that the touring gentlemen took a look at his nearly completed Imperial Hotel and later published articles in the Tokyo papers declaring the work to be an insult to American architecture.

Nor were the architects alone, according to Wright. The Western Society of American Engineers warned him that his "scheme for foundations was unsound."

• No favorites—The Imperial is perhaps his best known work today. And, one suspects, his special pride and joy, although he parried a request to name his favorite design: "My favorite is the job I have in my hands right now." But he did confess, when pressed further, to a little bit of a special paternal feeling for the Imperial. "Because it was a triumph over the earthquake," he explained. "And I had to oppose the whole engineering fraternity to do it."

The Imperial, alone among Tokyo's big buildings, survived with only slight damage the disastrous Japanese earthquake of 1923 and silenced Wright's critics. So silenced them, he told us with a touch of irritation at the recollection, that an AIA commission that went to Japan to study the damage caused by the earthquake neglected even to mention the hotel's remarkable performance.

A more eloquent commentary on the Imperial's quake record is the widespread use today of the mat foundation for buildings on soft subsoil. The Imperial site had an 8 ft layer of fill overlying 60 ft of mud. Wright saw the mud as a gigantic cushion against the ever-threatening earthquake. He devised a jointed foundation supported on thousands of poured-in-place concrete piles, 8 ft long and spaced 2 ft apart. Holes for the concrete were made by 8 ft wood poles, driven into the fill by hand-hoisted pile drivers.

"As soon as we pulled the wooden pole out, we would start shoveling concrete in as fast as we could so the hole wouldn't close up," he said, demonstrating with appropriate motions.

• AIA is whipping boy—The lack of admiration for Wright that was typified by the Tokyo criticism has never been one-sided. He had then—and still has—an outspoken disdain for academicians and academic principles in architecture. He often expresses it in some scathing comment about the AIA. Once he labeled that body the "Arbitrary Institute of Appearances." More recently, in commenting on the proposed extensions to the U. S. Capitol, he registered opposition, which is the official position of the AIA, and then replied to a question on the status of American architecture: "Architecture is coming along fine except for the AIA. The only thing wrong with architecture is the architects."

A local AIA chapter in Ohio, so goes a story about Wright, once collared him when he happened to be in town on the day of one the group's regular luncheon meetings. Asked to say a word or two after the meal, the famed architect rose and sniffed inquiringly

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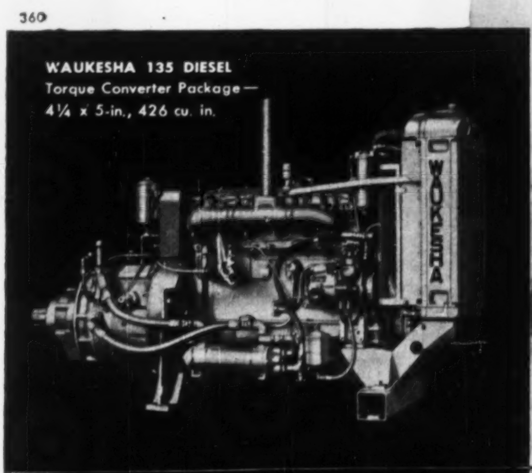

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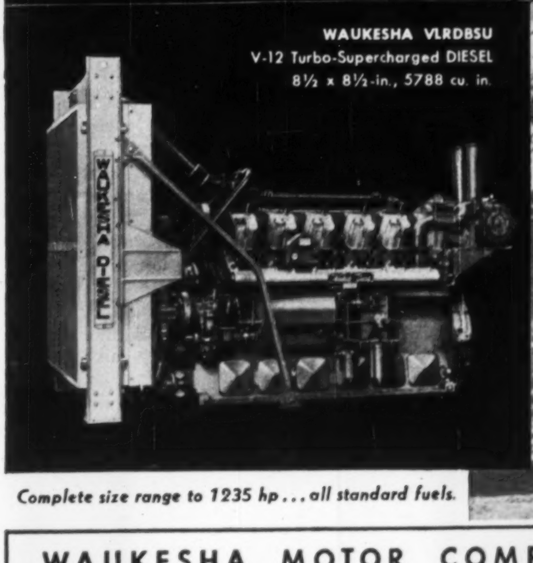

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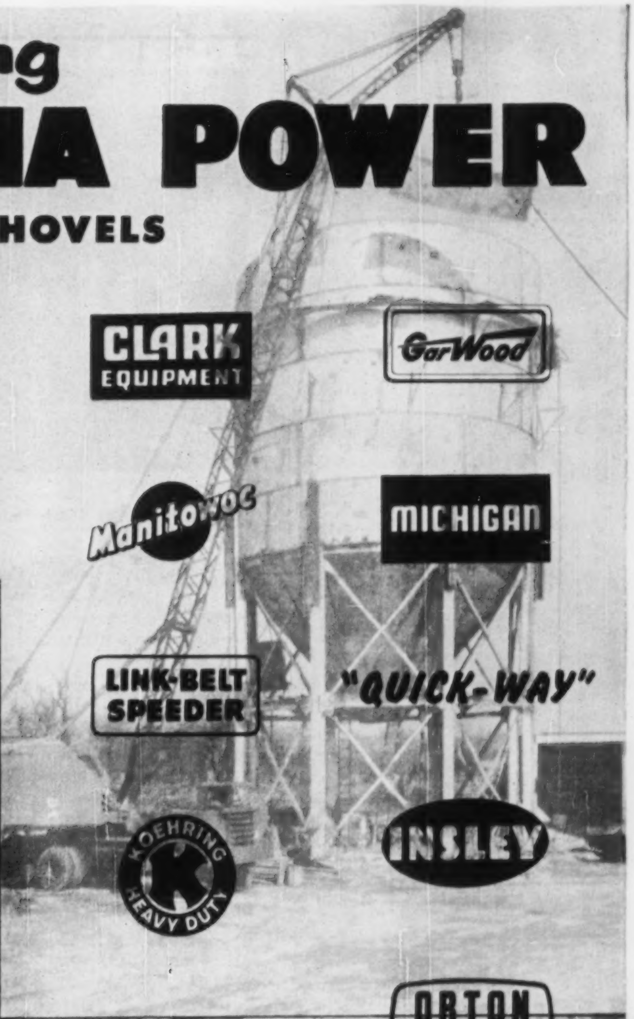

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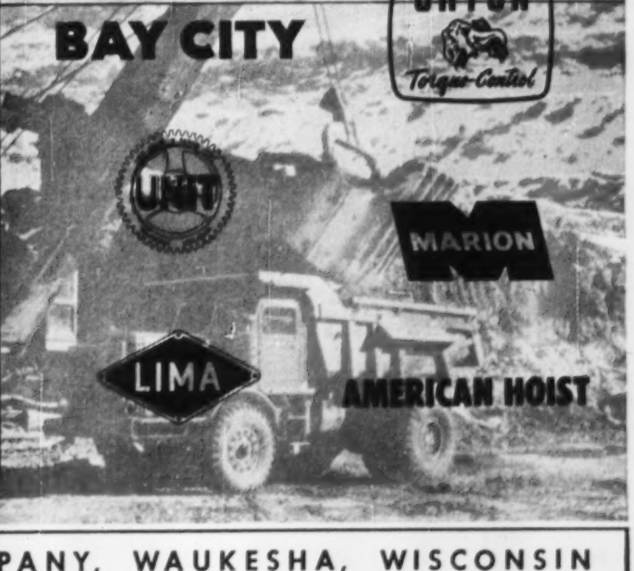

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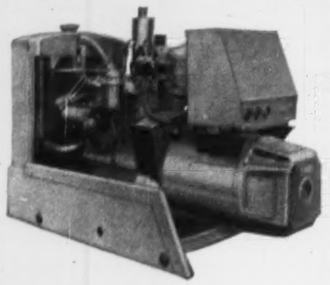

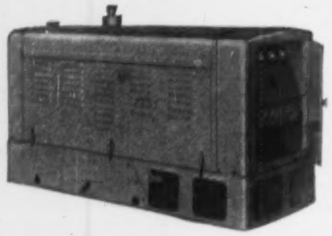

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WRIGHT VS. NERVI—Architect Wright and Italian engineer-builder Pier Luigi Nervi (second from left) debate esthetics of American engineering.

about him. "I always wondered what an AIA meeting was like," he is reported to have said. "So dead. So dead. And so little smell."

• Architecture, not architects—When ENR asked why he had never joined the AIA, he explained: "There is an element of gangsterism in professionalism. I refuse to have a part in maintaining a refuge for incompetents. I'm interested in architecture—not architects."

While the AIA is a perennial Wright target, it is not the only one. He has blasted such revered individuals as Michelangelo (for putting the dome of St. Peter's on stilts, far above the natural buttress of earth) and Sir Christopher Wren (for the same offense in St. Paul's in London).

Cities, whose passing in favor of an endless decentralized suburbia he sees as inevitable, come up frequently for critical review. "The modern city," he told the American Municipal Association last year, "is a place for banking and prostitution and very little else."

Wright's views on cities led to a lively disagreement with Pier Luigi Nervi, noted Italian engineer-builder, when the two designers met last year at a reception honoring Nervi in New York City (ENR May 3, 1956, p. 27). When Nervi praised the beauty of engineering in this country, Wright objected, declaring: "Even the bridges in New York are awful."

Even the crumbled classic temples of Athens have not escaped his unawed appraisal: ". . . Here was noble, beautiful stone insulted and forced to do duty as an imitation enslaved to wood."

• Almost a civil engineer—Such irreverence, however, while it indicates Wright's freedom from hallowed fetters and rigid preconceptions, hardly explains his success.

It began with his mother, he said once. She decided before he was born that she wanted her son to be an architect. When he reached college age, he had to settle for a civil engineering education since the University of Wisconsin—there was not enough money to send him away to another school—had no architecture curriculum. He stayed with it till only three months stood between him and a civil engineering degree. That was in 1887. Then he dropped college and got a job drafting in Chicago. A short time later, he went to work for the Chicago architectural firm of Adler and Sullivan. Louis Sullivan, to whom Wright now refers affectionately as "lieber Meister," had already caught Wright's imagination with the decree: "Form must follow function."

• Made ENR in 1890—It was during the Adler and Sullivan period that Wright's work was first published. ENR ran a series of illustrated articles in 1890-91 on construction details of the Chicago Auditorium, an Adler and Sullivan design. Wright made the drawings used to illustrate the articles.

Leaving Adler and Sullivan in 1893 to set up his own office in Oak Park, Ill., a Chicago suburb, Wright began to attract attention with his houses. He had conceived and put into practice the idea that architecture is not the walls and roof, but the space. He had refined Sullivan's edict to: "Form and function are one."

• Europe discovered him—Americans were somewhat cool to "the new school in the Middle West," but European architects warmly praised it.

Mr. Wright explained to ENR that

for WATERFRONT INSTALLATIONS, too –
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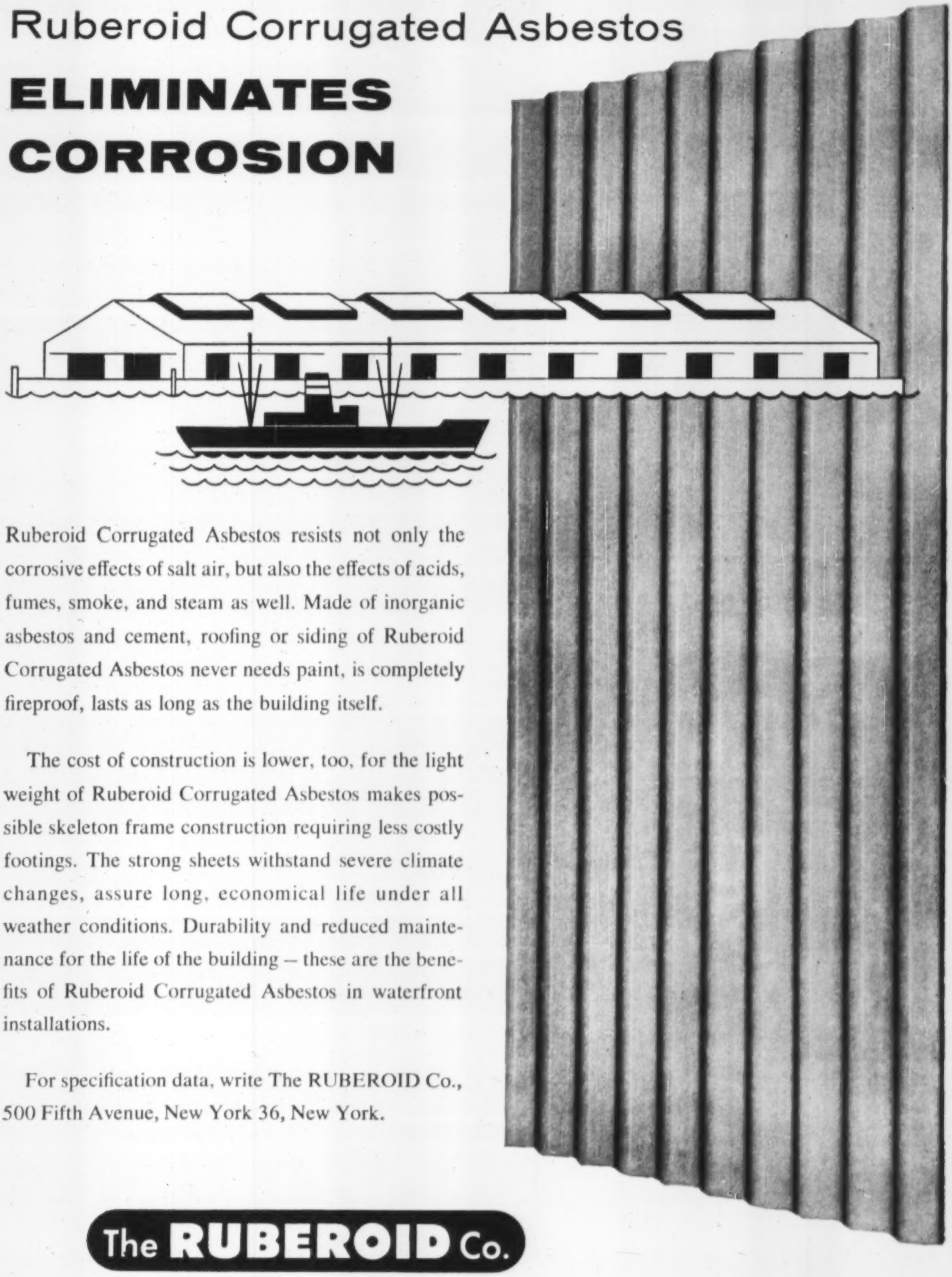

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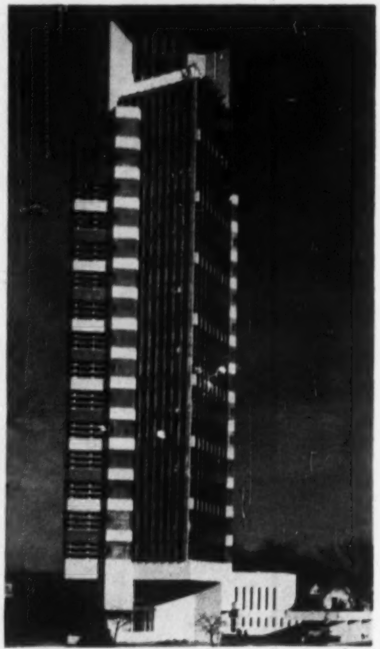

H. C. Price Co. photo

PRICE TOWER, designed by Wright, dominates Bartlesville, Okla.

Americans of that day were accustomed to importing their culture and didn't like to see it coming out of their own midwest. So it went abroad and came back as an import, which made it acceptable. The first route back to this country was in a book published in Germany in 1910 covering Wright's work up to that time. By then, he had designed his first office building (1905), for the Larkin Co., Buffalo, N. Y. This building has been credited with an impressive list of office-building firsts, including complete air conditioning, acoustical wall treatment, all metal furniture and plate glass doors. Other innovations sometimes credited to Wright and now in common use include indirect lighting, and radiant heating from pipes embedded in the floor. On the less spectacular side, he is said also to have originated the hanging toilet wall.

• **Depression nurtured school**—In 1932, when the depression dried up architectural work, Wright and his wife established the Taliesin fellowship at their home (Taliesin) in Spring Green, Wis., for the teaching of young architects. "We didn't have any architure to do," he told ENR, "so we decided to try our hand at architects."

An integral part of his practice today, the followship is highly unusual, in that it trains architects and also turns out jobs just as other design offices do. He emphasized to ENR, however, that it is "truly a cultural endeavor. Youngsters come to me to learn what I can pass on to them. To learn it by doing it. By living with me and working with me. While they are with me, they are like the fingers of my hand." He flexed his fingers as he spoke.

The disciples flock from all over the world to learn at his feet. The current crop of 40 includes boys from China, India, Japan, France, Italy, South Africa and Venezuela. Wright calls it a little UN.

The international flavor is not surprising since Wright is so widely recognized abroad. Most of his commissions are American, but he has a large following in other countries. He said that Mies Van der Rohe, the renowned German architect, now practicing in Chicago, used to write him letters beginning: "Dear Master." He pointed out, with pardonable pride, a diploma attesting to the fact that the Swiss Federal Institute of Technology had just conferred on him the degree of doctor of engineering. Fishing around unsuccessfully on a table top for another diploma, he added that he had recently received the same honor from a German school. His biggest current project is the design of a $45 million cultural center for Baghdad. King Feisal, the Iraqi monarch, commissioned him last June to design the building, which will be constructed on an island in the Tigris River.

• **State won't recognize school**—Taliesin students follow no curriculum. Wisconsin refuses, for this reason, to recognize the fellowship as a school. The boys pay $1,500 a year for the first four years. That includes room, board and transportation. They work on Wright projects. After the four years, they can leave or stay on as permanent staff, Wright said. He prefers to get them right out of high school with no academic training in architecture. "They don't learn anything in college," he stated. "I didn't learn anything."

Referring to suspicions from some quarters that the first function of the students is to turn out the work, he said: "I pour every dollar I get my hands on into it [the fellowship]. It keeps me in the red."

Nine members of the fellowship's permanent staff, including Wright's wife, daughter and son-in-law, have been working together for 24 years. The son-in-law, Wesley Peters, a civil engineering graduate of Massachusetts Institute of Technology, is the group's full-time structural engineer. Wright

New Carquinez Bridge being fabricated and erected by American Bridge Division, U. S. Steel Corporation for the State of California.

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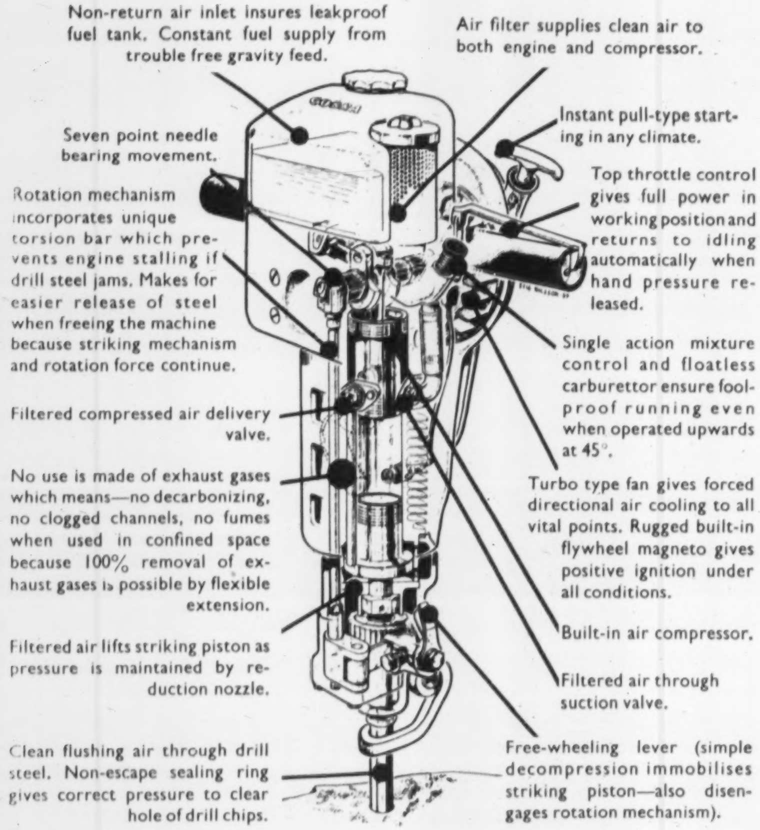
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DST/86

said they also consult frequently with outside engineers. He named Mendel Glickman, of the University of Oklahoma, as one.

What about Taliesin graduates, we inquired.

"Over a hundred of them are now practicing," he answered. "And we haven't lost a one to conventional architecture."

We asked Wright what he thought of engineers in general. He replied that he had always regarded them as "rudimentary architects." Usually, he said, engineers don't have the feeling for form.

We wondered if he thought that true of the bridge builders. "Roebling was a poet," he declared. The New York bridges are not too bad, he admitted, "but when you ride across a bridge like the George Washington and see all that tower steel in compression, it's just wrong. Steel is for tension."

Volume-wise, Wright's practice is more successful now than at any time in its history. Up from $2 million annually a few years ago, work is now flowing through his office at the rate of $15 million a year (estimated construction cost), not counting the $45 million Baghdad project. He has designed some 760 projects and supervised the construction of all but a few.

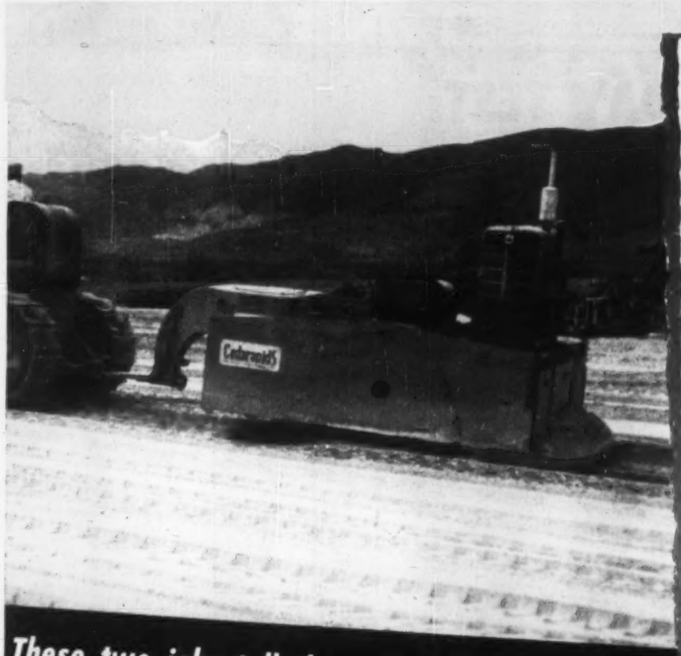
"We regretted those few," he commented, shaking his head.

• No front man yet—He designs everything credited to him, Wright said. That includes furniture, rugs and other furnishings as well as buildings. When a project comes in, he gets on the board himself and turns out voluminous drawings. Later on he takes the sketches into the drafting room and parcels out the work. But he participates actively in conferences at all stages of a job. He is in and out of the drafting room frequently and never completely delegates a project.

When we wondered how most commissions originate, he said: "I have never in my life asked for a job or had anybody put in a good word to get a job for me. My feeling," he explained, "is that when the man goes after the job, he belongs to it. When the job goes after the man, then it belongs to him."

One of Wright's most spectacular designs is the widely publicized Kaufman House at Bear Run, Pa., with a concrete deck cantilevering over a waterfall. Other outstanding jobs include the Johnson Wax Building, Racine, Wis.; First Unitarian Church, Madison, Wis.; and his home, Taliesin West, Phoenix, Ariz.

Among his current projects, besides



IMPERVIOUS CLAY COMPACTED TO 97% DENSITY IN SINGLE COVERAGE

For construction of an earth and clay dam for flood control, and relocation of Highway 85-87 north of Colorado Springs, 2,000,000 yards of earth had to be compacted into dense fill. Minimum compaction time was allowed, because this main route to Denver had to be opened to traffic as quickly as possible.

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Compaction time saved by utilizing the exclusive Cedarapids principle of impact-compaction through pneumatic tires played an important part in opening Colorado's new 4-lane highway for traffic just 4½ months after the job was started, *and well ahead of schedule*.

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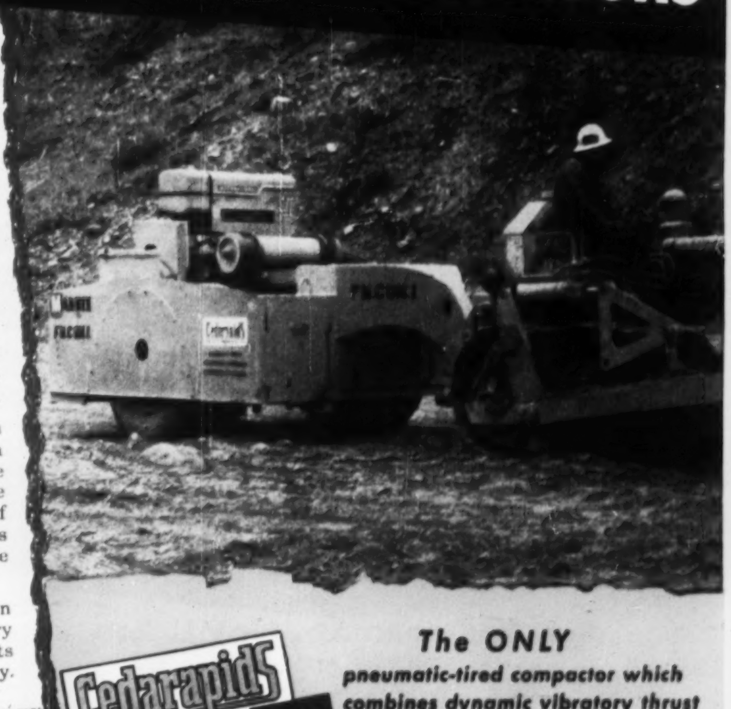
In Yoho National Park in the Canadian Rockies, Mannix Ltd. of Calgary used a Cedarapids Vibratory Compactor to assure not only lower future highway maintenance costs, but also to cut construction costs of the original base because fewer coverages and less time are required with the Cedarapids unit.

Square M Construction Ltd. of Edmonton used two of their four Cedarapids Vibratory Compactors to accomplish the same results on the Banff-Jasper section of the highway.



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the Guggenheim Museum and Baghdad cultural center, are Beth Sholom Temple, a million dollar synagogue in Philadelphia; a post office for Baghdad; a factory for Lenkert Electric Corp., San Mateo, Calif.; a residence, Gillen House, Dallas, Tex.; a Greek Orthodox Church, Milwaukee; and a Christian Science Church, Bolivar, Calif.

About the future, Wright said he is content to think that the fellowship will go on for 50 years after he is gone. His wife, Olgivanna—maybe others—will run it.

"After 50 years," he said, "well, after that I don't care."

Degenkolb Elected Head Of Engineers Association

The Structural Engineers Association of California elected Henry J. Degenkolb president for 1958. Serving with him as vice president will be William T. Wheeler, Los Angeles consulting engineer. Secretary-treasurer will be Charles D. DeMaria, structural engineer with San Francisco consulting engineer Henry J. Brunnier.

Mr. Degenkolb is a partner in the San Francisco consulting firm of John J. Gould and Henry J. Degenkolb. A 1936 graduate of the University of California, he worked on design of the San Francisco 1939 world's fair.

Armco C. E. Scholarships To Be Handled by NSPE

A $15,000 yearly civil engineering scholarship program under supervision of the National Society of Professional Engineers has been set up by Armco Drainage & Metal Products through the Armco Foundation, Inc., Middletown, Ohio. Five $3,000 scholarships will be awarded annually, which will provide $750 a year for recipients engaged in a four-year civil engineering curriculum.

The national society recently has adopted a policy of soliciting and entering into agreements with associations, corporations, foundations or individuals desiring to make scholarship and fellowship grants in the engineering field.

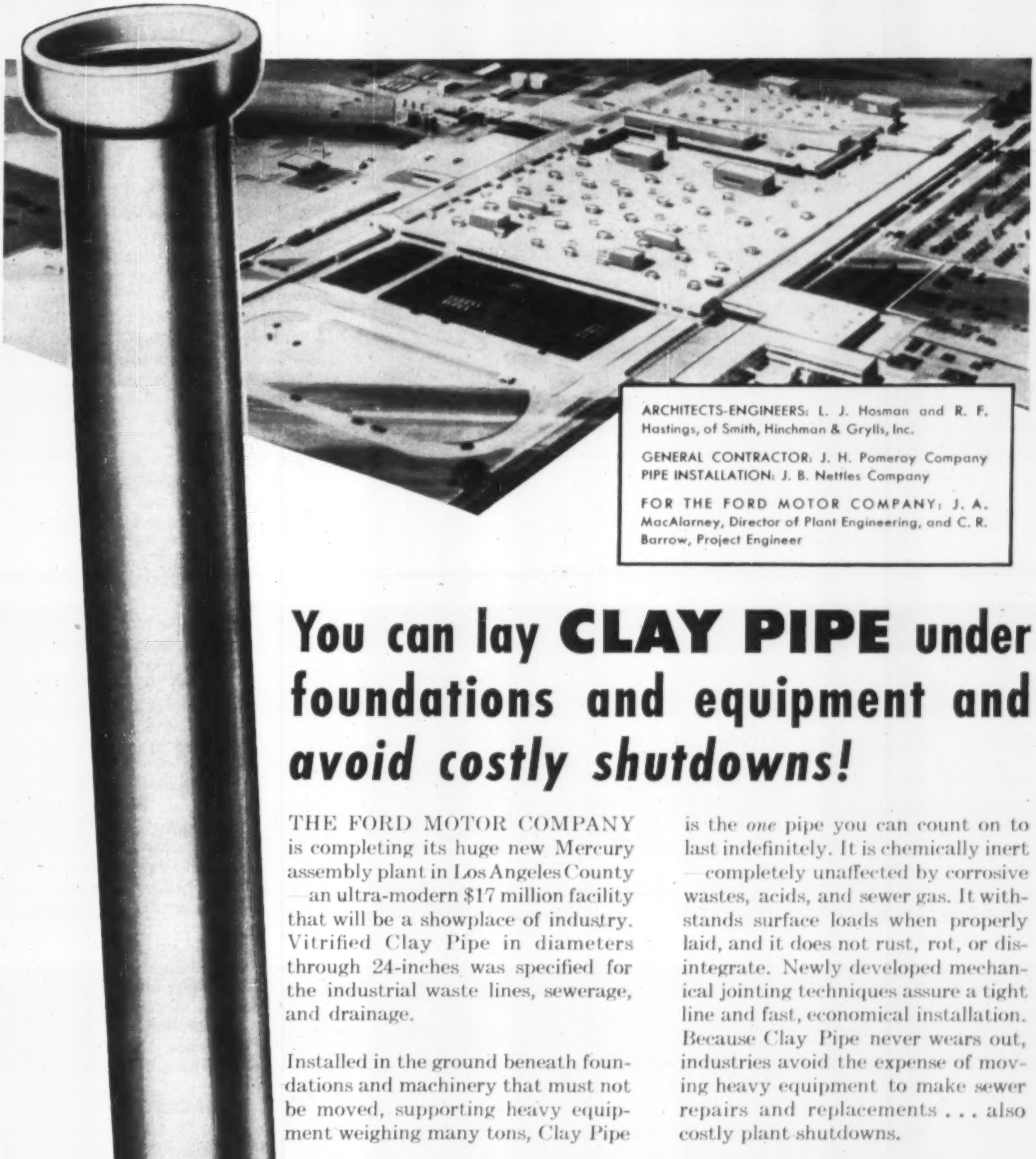
Careers

Business

Peter A. Strobel and **Paul I. Rongved** have formed the partnership of Strobel & Rongved, consulting engineers, New York City.

Public Works

Carl E. Roberts has returned to the Corps of Engineers after 10 years' service with the Federal Power Commis-



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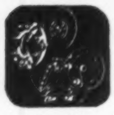

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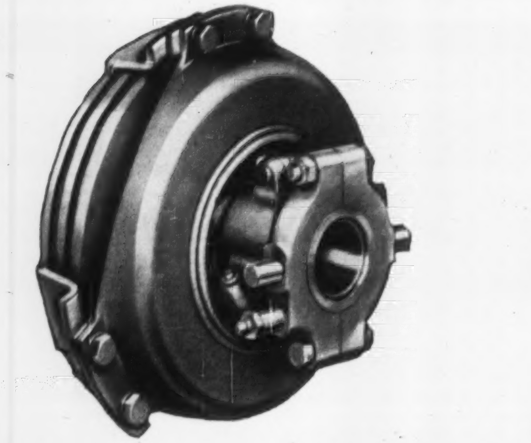

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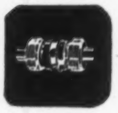

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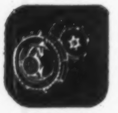
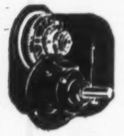
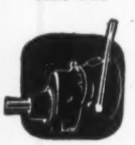


Heavy Duty Over Center



Power Take-Offs



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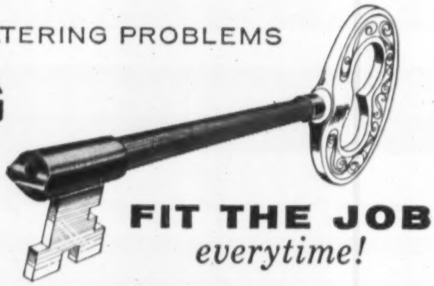

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sion in Ft. Worth. He will conduct hydroelectric power studies in the planning and reports branch of the engineering division of the Southwestern Division, Dallas.

J. Ross Pollock, chief design engineer for the Montana State Highway Commission, resigned in October, after 24 years with the department.

I. A. DeFrance has been appointed maintenance engineer for the Oregon State Highway Commission. **Edward F. Chidsey** was promoted to assistant maintenance engineer. **Walter T. Wright** has been named assistant right-of-way engineer, and **Jack A. Rowland** is now chief locating engineer.

Robert Humphreys, Frankfort, Ky., who for the past two years has been Kentucky's Commissioner of highways, has resigned. He will be succeeded by **James W. Martin,** former State Finance Commissioner.

Roger B. Stone, for 17 years chief engineer for the Pennsylvania Turnpike Commission, has resigned. He first became affiliated with the Commission in 1936 and, except a four year period ending in 1947, has been with it ever since.

Hylton Graham has been appointed chief of the plant division of the National Bureau of Standards, Washington, D. C.

Richard D. Duke has been employed as associate planner for the Tri-County Regional Planning Commission at Akron, Ohio.

Otto H. Hall has been employed by the Colorado State Planning Department to supervise construction of state buildings.

A. G. Odell and **T. C. Cooke** have been named chairman and vice chairman, respectively, of North Carolina's State Building Code Council.

Elmer B. Mellor, has been named head of the military design department, Sacramento District, Corps of Engineers.

Robert A. Mitchell, who has served as traffic engineer for Wilmington since 1954, has been named acting chief engineer for the city. He succeeds **Edwin F. Koester,** who retired.

Col. Robert L. Mushen has taken up the Dallas post of executive officer of the Southwestern Division, Corps of Engineers' on his return from Germany, where he was commanding officer of the 11th Engineer Combat Group.

Horace A. Johnson, chief, construction-operations department, Sacramento District, Corps of Engineers, has been named to a supervisory position in the Mediterranean Division, headquartered in Leghorn, Italy.

Edmond D. Burke has been appointed engineer of design for the Department of Highways, District of Columbia. He has been with the department for 10 years, prior to which he was a structural engineer with the Bureau of Yards and Docks, Department of the Navy.

Honors

John R. Suman, of Houston, former vice president and director of Humble Oil & Refining Co. and Standard Oil Co. of New Jersey, has been awarded the John Fritz Medal for 1958. Joint sponsors of the award are the American Society of Civil Engineers, American Society of Mechanical Engineers, American Institute of Mining, Metallurgical and Petroleum Engineers, and the American Institute of Electrical Engineers.

O.K. Normann, deputy assistant commissioner for research, U.S. Bureau of Public Roads, is the first recipient of the Theodore M. Matson Memorial Award, for "the advancement of the science and profession of traffic engineering". Presented at the recent meeting of the Institute of Traffic Engineers, the award is sponsored by the Theodore M. Matson Memorial Fund, Inc., New Haven, Conn. A member of BPR's staff since 1928, Mr. Normann is probably best known for his work on highway capacity.

Education

Prof. A. Diefendorf, formerly at University of Utah, is now dean of the School of Engineering at College of the Pacific in Stockton, Calif.

J. F. Downie Smith, dean of the division of engineering at Iowa State College, has resigned, effective Dec. 31. He will become a vice president and director of research for Carrier Corp., Syracuse, N. Y. **M. S. Coover,** associate dean, will become acting dean of the division.

Associations

Wyatt R. Underwood, Jr., has been elected president of the New Mexico branch, Associated General Contractors of America. **George A. Rutherford** was chosen vice president of the group, and **Ernest H. Blumenthal, Jr.,** was re-elected secretary-treasurer. All three are from Albuquerque.

J. E. Hassell, Jr., of Charleston, S. C., was elected president of the Carolinas Ready Mixed Concrete Association at its annual meeting Oct. 27-29. Other officers installed are: **A. L. Muirhead** of Durham, N. C., vice president; **Allen K. Owen** of Winston-Salem, N. C., secretary; and **Raymond E. Manieri** of Greensboro, N. C., treasurer.

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Long-range outlook on the extensive road program, and new "jet-age" airbases, indicates a steadily-rising curve of construction activity in all areas. It also indicates plenty of paving business ahead for the contractor who is in a position to compete favorably in the bidding, and who can profitably complete contracts *on schedule.*

In planning your equipment spread, you can't afford to gamble on the production end of your job — *at the paver,* where every second counts. That's where the *reserve* production capacity of a Koehring 34-E *twinbatch*® protects your schedules and profits. It hits a top output of 86.7 batches an hour, on 60-second mixing cycle. This lets you pick up any lost time, when you need it, to offset normal job and material delays — maintain a high *average* speed throughout duration of the job — keep batch plant, trucks and finishers working at peak efficiency. With *twinbatch* Autocycle control, every mixing operation is automatic, accurate, and fast. Drum charging, mixing, transfer and discharge are all synchronized by Koehring Batchmeter, a simple timing device. 8-second skip-hoist speeds charging. Big, double-door bucket and wide-swinging boom speed concrete distribution on the grade. What's more, accessibility of every paver maintenance point, plus heavy-duty construction, all help to keep paving jobs rolling *on schedule.*

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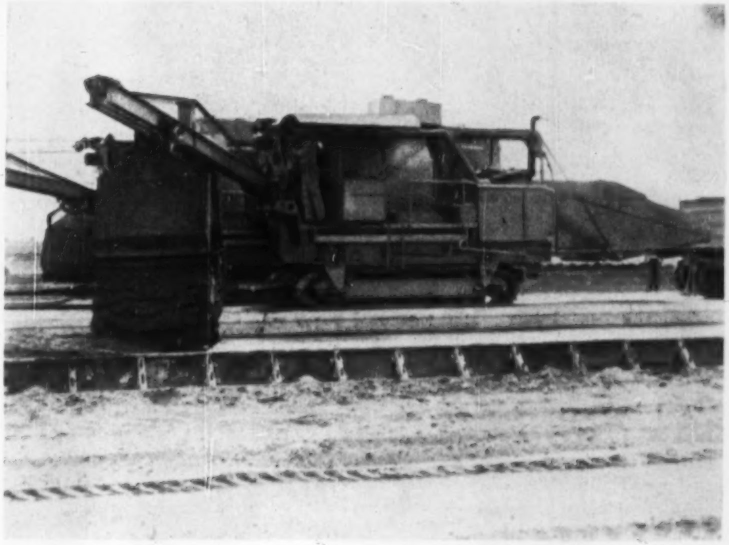
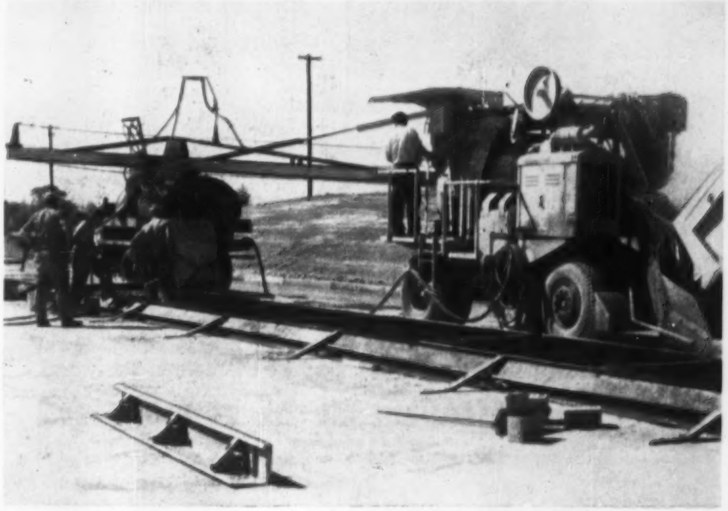
34-E *twinbatch* team works side-by-side on big U. S. airbase

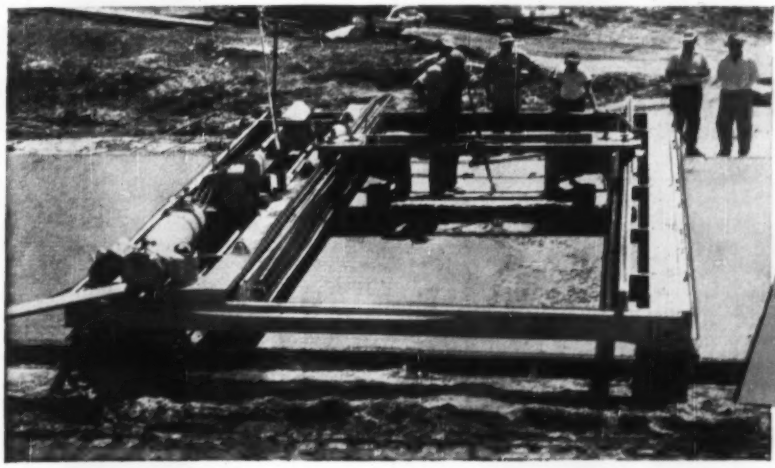


Widening runways on a military airstrip, contractor completed job "on the double" with a pair of big Koehring 34-E *twinbatch* pavers. Notice how one long-boom 34-E poured the outside half, while the other poured the inside half of the strip. For balanced, high rate of production at *both ends* of the job, many contractors team up *twinbatch* pavers with C. S. Johnson automatic batch plants (another Koehring product worth checking). Clamshell cranes, finishers also available in big Koehring paving "package".

Mobile 16-E paves center-strips, intersections, bridge-approaches



On street and highway jobs, there's always extra concrete to be laid in addition to the main slab, such as curbs, gutters, center-strips, scattered intersections, approaches to driveways, bridges and side-roads. Consider the time-saving flexibility you can get with a rubber-tired *twinbatch* in your paving spread. This Koehring 16-E is as mobile as your batch trucks — can get back on the new slab *in as little as 7 days* to do clean-up work, or pave adjoining strips. Also has high elevated discharge, pours into overhead hoppers, forms, chutes. You'll find its usefulness unlimited as a utility unit . . . or as a general-purpose paver.

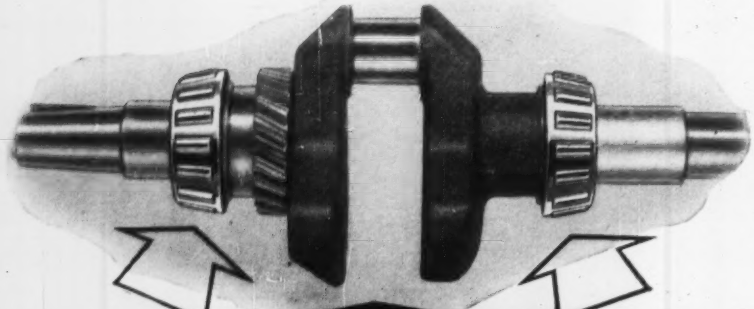


"Timely" precision-finishing —

is important on every paving job. Operating at almost twice the speed of a 34-E paver, Koehring Longitudinal Finisher handles all practical consistencies of concrete — harsh, wet or dry — produces smooth, mechanically-accurate slab with uniform crown transitions.

KOEHRING
DIVISION OF KOEHRING COMPANY
Milwaukee 16, Wisconsin
KOEHRING HEAVY DUTY
EXCAVATORS • CRANES • PAVERS • FINISHERS • DUMPTORS® • MUD-JACKS®

K753REV



Tapered Roller Bearings

Support BOTH ENDS of EVERY

WISCONSIN ENGINE CRANKSHAFT

Main bearing failure is unheard of in Wisconsin Heavy-Duty Air-Cooled Engines even when operating under heaviest loads on continuous duty. The tapered roller bearings take end thrust and side-pull, and mount on a crankshaft that is drop forged for maximum strength and load carrying capacity. Also, the bearings are self-cleaning, reducing engine maintenance and servicing.

The strength of tapered roller bearings and the drop-forged crankshaft contribute greatly to the rugged, long-term, trouble-free performance your Wisconsin Engine delivers. Write for handy service map S198 and list of distributors and service stations throughout the world.

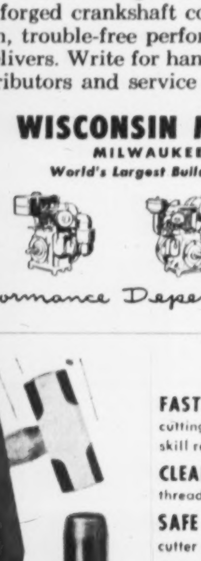
WISCONSIN MOTOR CORPORATION

MILWAUKEE 46, WISCONSIN, U. S. A.

World's Largest Builders of Heavy-Duty Air-Cooled Engines

MOST H.P. HOURS

Better Performance Depends on Better Features....



CUTTING WIRE ROPE IS EASY

the MORSE-STARRETT way

FAST Especially designed cutting blade and dies assures fast cutting action. The hammer principle eliminates any special skill requirements.

CLEAN Wire rope ends are cut smooth and clean for perfect threading or splicing.

SAFE The enclosed cutting blade locked in the body of the cutter assures perfect safety.

PORTABLE Models for tool kit or stationary operation. With cutting capacities up to: 1 inch, 1-1/16 inch, 1-1/2 inch.

SEE YOUR DEALER OR WRITE DEPT. "B"

MORSE-STARRETT PRODUCTS CO.

1204 - 49th AVENUE, OAKLAND 1, CALIFORNIA

Obituaries

H. Ray Morrow, 55, municipal streets superintendent at Statesville, N. C., died Oct. 16. He had been a city employee for 32 years.

Joseph J. Jessup, 91, city engineer of Los Angeles from 1930 to 1934, died Oct. 27. He also had served as city engineer at Berkeley and at Torrance, Calif., and as Imperial Valley County Highway Engineer. In the academic field, Mr. Jessup was professor of engineering at Pacific Coast College, Newburg, Ore., and an instructor at the University of California at Berkeley. For four years he served as president of Whittier Academy in California, which later became Whittier College.

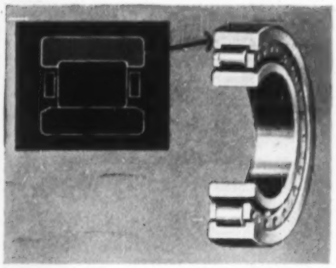
Edward M. Taylor, 81, former president of DuPont Building Construction Co., died Oct. 31 in Wilmington. An employee of the DuPont Co. for more than 25 years, Mr. Taylor retired in 1942 as director of the office buildings division. He had served as area engineer in the construction division, as plant engineer in the experiment station, and as managing director of the corporation. From 1906 to 1914, he was chief engineer for Roebling Construction Co. of New York City.

Edward A. Fulton, 57, consulting engineer and president of Fulton Engineering Co., Overland, Mo., died Nov. 12. A graduate of Massachusetts Institute of Technology, he specialized in municipal, hydraulic and sanitary engineering.

Howard E. Moses, 82, director, Division of Sanitary Engineering, Pennsylvania State Department of Health, died Nov. 13 in Reading, Pa. He had been an engineer with the department for 50 years. In 1951 Mr. Moses was recipient of the Charles Alvin Emerson Award of the Federation of Sewage & Industrial Wastes Associations—one of the highest honors in the field of sanitary engineering. He has played one of the busiest and most important roles in Pennsylvania's stream-pollution abatement program.

Edwin J. Kinney, 58, chief engineer for Montgomery County, Pa., and former Pennsylvania State Highway Department official, died Nov. 13. He was with the state from 1919 until 1939, when he returned to private industry as general manager for Minder Construction Corp. of Chicago. In 1944 he returned to the state and from 1950 to 1956 was chief engineer for District 6.

Loggers' "weight-lifter" tests bearing stamina!



TWO-LIP RACE INCREASES RIGIDITY

Two parallel shoulders made integral with the outer race, as shown in gray above, increase rigidity and durability —keep rollers in proper alignment. Precision-ground rollers and races give quieter, smoother operation.

Tossing around logs 6 feet in diameter like toothpicks is no job for a softie! This machine has to be *built* for it right from the start—*right down to the bearings*. And that goes, too, for the trucks which haul these back-breaking giants over the most rugged terrain. Bower tapered and straight roller bearings have been *engineered* for just such work as this—to last longer, perform better under any road or load condition. Painstaking quality control plus basic bearing design refinements—like those shown at left—have reduced Bower Bearing failure to a practical minimum. *Whatever* your product, if it uses bearings, specify Bower! There's a complete line of tapered, straight and journal roller bearings for every field of transportation and industry.

BOWER ROLLER BEARING DIVISION
FEDERAL-MOGUL-BOWER BEARINGS, INC. • DETROIT 14, MICHIGAN

BOWER ROLLER BEARINGS

CONCRETE TESTERS

The world's finest low-cost precision testers.

For

CYLINDERS
CUBES
BLOCKS
BEAMS
PIPE

If it's a concrete tester you need—get in touch with

FORNEY'S, Inc.
TESTER DIVISION
P. O. BOX 310 · NEW CASTLE, PA.

FOR SAFE AND SPEEDY HOISTING

Heavy construction calls for heavy-duty blocks and MADESCO blocks combine the performance features developed through 30 years of specialized engineering for the construction field. Heavy steel shells and fittings, heavy iron or steel graphite-bronze, self lubricating sheaves are grooved to give you the maximum return for your rope investment. Sheaves equipped with bronze or anti-friction bearings for easy operation and long service.

Our special service departments will help you with their recommendations. Write for our catalog or consult your equipment dealer who can supply you with MADESCO products.

MADESCO BLOCKS

MADESCO TACKLE BLOCK CO.
EASTON, PA.

Engineered to Serve Your Special Service Needs

Unit Prices

Concrete Pavement in Michigan

This $1,813,739 contract to The Cooke Contracting Co., Detroit includes 0.744 miles of grading, drainage structures and 9 in. uniform concrete paving with concrete curb and gutter, 36 ft wide face to face, also 6.299 miles of grading and drainage and dual 24 ft concrete pavement on trunkline M-20, Bay County Michigan. Work is for the Michigan State Highway Commission.

Wages effective through August include: form setters $2.81, pipe layers $2.48, tractor operators $3.14 (these go up 2¢ per hour September 1), truck drivers $2.45-2.65, carpenters $2.975, cement finishers $3.00 (these go up 10¢ per hour on September 1).

Class A concrete takes 1.375 bbl of cement per cu yd and must develop 3,500 psi at 28 days in compressive strength.

The project is in Monitor and Bangor Townships, Bay County, one mile from a railhead. Transportation by water and highway is also available.

Contractor furnishes all materials, except borrowed earth.

The successful bid is only a fraction above the engineer's estimate, but 14.7% below the high of ten bids. The bidding included:

1C	Cooke Contracting Co., Detroit, Mich	$1,813,739
2	Hertel-Deyo Co. & C. E. Utterback, Grand Rapids, Mich.	1,861,367
10	Rieth-Riley Constr Co., Battle Creek, Mich.	2,126,121
EE	Michigan State Highway Dept., Lansing	1,812,153

Dual 24 ft Concrete Pavement, 6.299 miles

Bids: 7-24-57 Items	Unit	Quantity	Unit Prices 1 C	2
Clearing	ac	10.50	$300.00	$275.00
Grubbing	srds	1,681	1.50	2.00
Removing trees 8″ 12″	ea	51	25.00	22.00
13″ 24″	ea	92	40.00	40.00
25″ 36″	ea	21	60.00	85.00
37″ & more	ea	1	100.00	150.00
old pavement	sy	33	1.50	1.00
masonry & conc	cy	52.2	5.00	6.00
sidewalk	sy	30	1.00	0.50
old culverts	ea	1	200.00	200.00
Excavation, earth	cy	920,736	0.38	0.34
Overhaul method #2	ccym	1,050,490	0.075	0.13
Shoulders, cl B	cy	26,752	0.45	0.50
Subbase, selected, 23A	t	43,842	2.35	2.40
Concrete, gr A	cy	627.6	60.00	62.00
Steel reinf	lb	64,077	0.12	0.13
Culverts, cl A 12″	lf	72	3.00	2.85
18″	lf	36	4.50	4.75
cl B 12″	lf	2,881	3.25	3.10
18″	lf	402	4.50	5.00
24″	lf	566	7.00	7.50
36″	lf	316	11.50	12.00
48″	lf	136	17.00	17.50
CMP, 18″	lf	296	4.00	5.00
reinf ellipt conc 60″x38″	lf	124	20.00	20.00
68″x43″	lf	120	23.00	24.00
Catch basins to 10′, 3B	ea	11	225.00	245.00
6B	ea	7	200.00	235.00
6E	ea	5	175.00	230.00
Inlets to 10′ depth, 2E	ea	4	200.00	240.00
Sewer to 10′ depth, 4″	lf	120	2.00	1.20
6″	lf	130	2.10	1.35
8″	lf	70	2.25	2.00
12″	lf	118	3.00	3.25
Tile underdrain, 12″	lf	46	3.25	2.75
Fine grading & cleanup	st	705	15.00	16.00
Conc curb & gut br appr	lf	450	3.50	3.00
det 12A	lf	70	3.50	3.25
Conc pave uniform 9″	sy	182,664	4.00	4.07
7″	sy	36	5.00	4.00
Pave reinforcement	sy	182,700	0.65	0.64
Bit binder course	t	230	13.00	14.00
prime coat MC-1	gal	4,770	0.25	0.25
conc wear course	t	1,289	13.00	13.50
matl applied AE-3	gal	4,144	0.25	0.25
Aggregate cover 26D	t	110	6.00	6.00
31D	t	76	6.00	6.00
base course		10,415	2.35	2.40
Topsoil surface	cy	36,875	0.45	0.45
Calcium chloride admixed	t	182.73	60.00	60.00
Shoulders cl A	t	21,292	2.35	2.40
Water	Mgal	77.1	10.00	12
Plain riprap	cy	93	5.00	12.00
Guard rail steel beam	lf	4,860	2.60	2.65
posts	ea	97	4.50	5.00
Sodding cl B	sy	32,281	0.45	0.39
Obliterating old road	ac	0.29	200.00	125.00
Mulching	t	64.5	50.00	48.00
Woven wire fence stl post	lr	4,082	6.00	6.00
Barbed wire	lr	4,082	0.25	0.30
Conc ROW Markers	ea	39	12.00	12.00

Concrete Pavement, 36 ft, 0.744 miles

Items	Unit	Quantity	Unit Prices 1 C	2
Clear	ac	0.12	300.00	275.00
Grub	sr	19	1.50	2.00
Remov trees, 8″ to 12″	ea	12	25.00	22.00
13″ to 24″	ea	8	40.00	40.00
Remov old pavement	sy	158	1.00	1.00
sidewalk	sy	17	1.00	0.60
catch basins	ea	1	30.00	35.00
hedge	st	0.3	100.00	40.00
Excavation, earth	cy	24,067	0.38	0.34
Overhaul method #2	ccym	67,872	0.075	0.13
Selected subbase 23A	t	3,192	2.35	2.40
Porous backfill gr B LM	cy	270	2.00	2.00
Concrete gr A	cy	14.2	65.00	65.00
Steel reinf	lb	217	0.12	0.15
Culverts cl B 36″	lf	108	11.50	12.00
Sewer to 10′ depth, 4″	lf	10	2.00	1.20
6″	lf	30	2.10	1.35
12″	lf	1,637	3.00	3.25
Sewer pipe underdr, 6″	lf	4,038	1.00	1.10
Sewer to 10′ depth, 15″	lf	990	4.00	3.50
Manholes to 10′ depth 1A	ea	10	225.00	245.00
Catch basins to 10′ 3B	ea	9	225.00	245.00
6B	ea	14	200.00	235.00
3A	ea	1	210.00	245.00
Covers A	ea	2	50.00	60.00
B	ea	2	70.00	65.00
Tile traps	ea	2	25.00	35.00
Catch basins, reconstr	ea	4	100.00	85.00
Manholes, abandon	ea	2	30.00	25.00
Fine grading & cleanup	sta	40	15.00	16.00
Conc curb & gutter det 8	lf	5,589	2.30	2.60
Conc pave unif, 7″	sy	120	5.00	4.00
9″	sy	14,084	4.00	4.07
Pave reinf	sy	14,204	0.65	0.64
Topsoil surface	cy	865	0.45	0.50
Calcium chloride admixed	t	7.6	60.00	62.00
Conc sidewalk 4″	sf	45	0.60	0.45
Approaches cl A LM	cy	656	3.75	2.40
Bit approach mixture	t	69	13.00	13.50
Shoulders cl A	t	570	2.35	2.40
Water for wetting	Mgal	3.9	10.00	12.00
Guide posts	ea	5	4.50	5.00
Markers conc ROW	ea	32	12.00	12.00
road project	ea	4	20.00	25.00
Mulching	t	3	50.00	48.00

Completion Date: September 30, 1958

Submarine Crossing of Skagit River, Wash.

This 800 ft crossing of the Skagit River, about 2 miles NW of Mt. Vernon, Wash., and part of a $1,000,000 filtration plant for the Anacortes, Wash. water system, will average $29.92 per lin ft.

The 24 in. pressure pipe of $\frac{5}{16}$ in. steel plate, with special joint harness and Dresser couplings, will be laid by Hydraulic Supply Co. at a total cost of $23,936. This is 4.3% below the engineer's estimate. Carey & Kramer, Seattle, Wash., is the consultant.

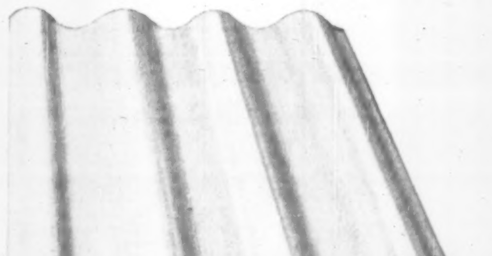
Contract date is Sept. 23, and completion is scheduled for 30 calendar Days.

Material will be shipped by water.

Muggy, salt-laden air from the Gulf of Mexico won't harm the new Schlumberger Well Surveying Corporation building for Johnston Testers, Inc. in Sugarland, Texas. Aluminum sandwich walls assure lasting protection against corrosion.

Engineer and Builder: The Austin Company, Houston, Texas
Alcoa Approved Applicator: Jamar-Olmen Construction Co., Houston, Texas

Build Faster for Less with Sandwich Wall of Alcoa Aluminum


Exterior — Alcoa Corrugated Sheet
Glass Fiber Insulation
Interior — Alcoa Corrugated Sheet

Sandwich wall of Alcoa® Aluminum is the lowest cost insulated metal wall system available. It saves money through lighter foundations and framing, permits faster erection with less on-site labor and allows earlier occupancy.

Expensive maintenance is eliminated by aluminum's resistance to corrosion from smoke, fumes, humidity and salt air. And aluminum sandwich wall with 1″ of glass fiber insulation has three times the insulating efficiency of 8″ masonry.

Economize for your clients. Specify sandwich wall of Alcoa Aluminum for industrial building jobs. Complete data available from your nearest Alcoa sales office or Alcoa Approved Applicator. Or write Aluminum Company of America, 860-M Alcoa Building, Pittsburgh 19, Pa.

ALCOA ALUMINUM
INDUSTRIAL BUILDING PRODUCTS
ALUMINUM COMPANY OF AMERICA

Your Guide to the Best in Aluminum Value

NEW! "ALCOA THEATRE"
Exciting Adventure, Alternate Monday Evenings

Materials and Labor Prices

Monthly Market Quotations by ENR Field Reporters

See following ENR issues for OTHER PRICES:

- Iron and Steel Products: Last, Nov. 14; Next, Dec. 12
- Wood Products, Glass, Explosives, Chemicals: Last, Nov. 21, Next, Dec. 19
- Clay Products, Lime, Plaster, Paint, Roofing: Last, Nov. 28; Next, Dec. 26
- Wage Rates, Building Board, Lath, Insulation: Last, Nov. 28; Next, Jan. 2

CEMENT, AGGREGATE, READY-MIXED CONCRETE—F. O. B. CITY

	PORTLAND CEMENT* Per bbl. C/L lots cash, dis. not deducted			SAND AND GRAVEL Per ton, carload lots			CRUSHED STONE Per ton, carload lots		CRUSHED SLAG Per ton, carload lots, f.o.b. plant		CONCRETE BLOCK 8x8x16-in.* truckload del.* per block		CONCRETE Ready Mixed 1:2:4 del. 50 cy & over
	Paper	Bulk	Mortar	Gravel, 1½ in.	Gravel, ¾ in.	Sand	1½ in.	¾ in.	1½ in.	¾ in.	Sand grav.	Lt. wgt. agg.	
Atlanta	$4.31a	$3.90a	$3.57	$2.18	$2.28	$2.50‡	$2.18	$2.33	$1.55	$1.65	$0.175	$....	$13.75g
Baltimore	4.45c	4.05c	3.52c	2.80‡a	2.80‡a	2.25‡a	2.85‡a	2.90‡a	2.05‡a	2.00‡a	.18	.18a	12.95/13.45
Birmingham	4.08	3.15f	....	2.53n	2.53n	2.13n	2.75	2.75	1.55	1.65	.18	.18	12.55
Boston	5.75be	4.67a	4.79e	3.00a	3.00a	3.00a	1.75a	1.85a	....	....	.23	.275a	15.00h
Chicago	4.13a	3.72a	3.65/3.78	3.78‡b	3.78‡b	4.13‡b	3.95‡b	3.95‡b	2.25‡	2.25‡	.25	.25b	14.00p
Cincinnati	4.48c	4.05c	4.03	2.29‡c	2.34‡c	2.34‡c	2.64‡c	2.64‡c	1.89	1.89	.19	.24a	13.25
Cleveland	N.A. in C.L.	....	3.88a	2.15ef	1.95f	1.65	4.50‡a	4.50‡a	3.35‡a	3.35‡a	....	.20	16.15
Dallas	3.55a	3.15a	3.43	2.60	2.65	1.90	2.43	2.63	....	....	....	.27	11.25
Denver	4.69a	4.19a	4.69	1.90	2.05	1.20	....	....	....	....	.22	.245a	10.70
Detroit	4.10a	3.60ag	3.73	4.50‡b	4.50‡b	4.25‡b	3.75‡	3.75‡	3.50‡	3.50‡	.23	.24a	14.20
Kansas City	4.45i	3.96a	4.25		....	1.70‡a	2.00‡a	2.00‡a	....	....	.23a	.26c	13.50
Los Angeles	5.12ch	4.68ch	5.60	2.56‡a	2.76‡a	2.41‡a	2.41‡a	2.46‡a	....	....	.14fm	.24m	12.96ih
Minneapolis	4.44a	4.04a	4.10	2.70‡ag	2.70‡ag	1.60‡ag	3.25‡ag	3.25‡ag	....	....	.19	....	14.30f
Montreal	3.21d	2.96d	3.60	1.95‡a	2.20‡a	2.25‡a	1.95‡i	2.20‡i	2.00	2.00	.20	.20a	10.80ak
New Orleans	3.75a	3.45a	3.70	2.44	2.44	2.00	....	....	1.45	1.65	.275	....	13.65
New York	4.83a	4.42a	3.72	3.20bk	3.20bk	2.30bk	3.10bl	3.10bl	....	....	.250n	.276b	17.40an
Philadelphia	4.57‡a	4.16‡a	3.61‡	2.85‡a	2.85‡a	2.35‡a	2.70‡	2.80‡	2.00	2.35	.25/.32	....	14.15do
Pittsburgh	5.50bjk	4.47bj	5.00bjl	2.60aq	2.60aq	3.00aq	2.00e	2.00e	2.10	2.10	.26	.28	15.55
St. Louis	4.01/4.33c	3.61/3.93c	3.86/4.18	3.25am	3.10am	2.40/3.10am	1.65j	1.75j	....	....	.24	.30c	12.40/12.90
San Francisco	3.94c	3.54c	4.38c	2.02	2.02	2.12	2.17	2.17	....	....	.24	.28cl	12.75c
Seattle	4.30a	3.75a	4.45a	4.00‡bm	4.00‡bm	4.00‡bm	4.50‡bm	4.50‡bm	....	....	.26	.37c	13.30j
Toronto	4.03	4.03	4.03	2.40‡	2.40‡	2.05‡	2.20	2.20	2.20	2.20	.25	.275e	15.25

‡ Delivered. * Prices incl. dealers discount except as noted.

CEMENT: *a Less 10¢ disc, 15 days. *b Less 2% disc, 15 days. *c Less 10¢ disc, 10 days. *d Truckload lots, deliv. 10¢ disc, 20 days. *e Truckload lots *f Fob mill, add 14.58 to $21.31 per car switching charges *g fob mill + freight *h LCL. *i Less 2% disc, 10 days *j Truck lots, fob yard *k 100 bag lots *l over 150 sacks

SAND GRAVEL, STONE & SLAG: *a Truck lots. *b Per cu. yd. *c 5 tons or more. *e ½". *f Pea gravel. *g Less 5% for cash. *h Less than 5 tons. *i Plus 5% mun. & prov. tax *j F.o.b. quarry. *k Barge lots asd. *l F.o.b. scow Hudson river. *m Less 2% for cash. *n F.o.b. cars. *q fob yard

CONCRETE BLOCK: *a Cinder *b Waylite. *c Haydite. *d Celocrete *e 5¼ x 8 x 12 in. *f 8 x 4 x 16. *g F.o.b. truck at job. *l F.o.b. plant San Rafael. *m F.o.b. yard. *n 8 x 8 x 18.

READY MIXED CONCRETE: *a 5 cu. yds. or over del. Man. *b 25 cu. yds or more: *c 10–100 cy. brackets. *d 1–3 mi. zone. *e 2,000 lb comp. *f 2,500 lb. comp. *g Less 25¢ disc, 15 days. *h Less 50¢ for cash. *i 5% off for cash. *j 2% off for cash. *k Federal tax included. Add 5% mun. & prov. *l 1:2½:3½. *m F.o.b. yard. *n Plus escalator clause. *o Add 15¢ for ea. add'l 1-mi zone. *p Heating charge 50¢

CASH DISCOUNTS CEMENT to Contractors: Truck delivery, 2% for cash on 10th of month; on carload deliveries, no trucking, same as dealer cash discount 10¢ per bbl. for payment within 15 days of date of invoice. Subject discount 10¢ per bbl. 20 days in Montreal.

CURRENT MAXIMUM PRICES AT CEMENT MILLS

Charge for bags not included. For paper bags add 40¢ per bbl., not refundable.

	Bulk		Bulk		Bulk		Bulk		Bulk
Richard City, Tenn	$3.30†	Buffington, Ind	$3.25†	Steelton, Minn	$3.45†	Muskegon, Mich	$3.30†	Toledo, O	$3.30†
Clinchfield, Ga	3.30†	Independence, Kan	3.10†	Leeds, Ala	3.15†	Saginaw, Mich	3.30†	Milwaukee, Wis	3.35†
Kingsport, Tenn	3.30†	Hannibal, Mo	3.35†	Duluth, Minn	3.45†	Wyandotte, Mich	3.30†	Green Bay, Wis	3.35†
West Des Moines, Iowa	3.35†	Northampton, Pa	3.35†	Hudson, N. Y	3.35†	Buffalo, N. Y	3.40†	Ironton, O	3.30†
Nazareth, Pa	3.35†	Universal, Pa	3.45†	Alpena, Mich	3.20†	Oswego, N. Y	3.45†	Montreal City	2.56†
Bath, Pa	3.35†	Waco, Tex. (+ 10¢ tax)	3.35†	Detroit, Mich	3.30†	Cleveland, O	3.35†	W. Winfield, Pa	3.45†
Lesley, Pa	3.35†	Giant, S. C	3.35†	Howes Cave, N. Y	3.35†	Alsen, N, Y	3.35†	Security, Md	3.35†

† *Prices to hold for fourth quarter of 1957.*

PAVING BRICK, BLOCK, ASPHALT, ROAD OILS—F. O. B. CITY

	PAVING BRICK AND BLOCK			PAVING ASPHALT Per ton, less than 80 penetration		ASPHALT BINDERS—FLUXES Per gal., 80–300 penetration		CUTBACK ASPHALT MC per ton		ROAD OIL Per gal.	ASPHALT EMULSION RSI Per gal.	
	Granite Per M lots of 50,000 4x4x8 in.	Brick per M 3x4x8½ in. carload lots	Wood per sq. yd. 3½ in. 16-lb. treat	Tank car	Drums	Tank car	Drums	Tank car	Drums	Tank car	Tank car	Drums
Atlanta	......	......	......	$30.50	$45.00	$0.15	$0.26	$0.125Pw	$0.28Pw	$0.14	$0.125	$0.30
Baltimore	150.00‡	......	......	23.00i	......	.095s	0.185i	.10iwE	.19iwE	.10i	.105i	0.195i
Birmingham	......	62.00i	......	......	......	......	......	......	......	......	......	......
Boston	......	......	......	24.00ap	46.00ap	24.00as	46.00as	.11aFw	.24aFw	.11ao	.174aGo	.25aGo
Chicago	150.00‡	90.00‡b	3.95/4.00‡j	24.25b	34.25b	21.40bv	31.40bv	.11bwH	.19bwH	.085b	......	......
Cincinnati	......	......	......	......	......	......	......	......	......	......	......	......
Cleveland	......	89.50d	6.30g	25.00A	......	25.00Av	......	.1115AwF	......	......	.1115AG	.21AG
Dallas	e	40.00	e	26.35	45.39	.1116	.1944	29.80	51.40	.1080	.1116	.1994
Denver	......	56.00	......	......	......	......	......	......	......	......	......	......
Detroit	......	115.00	......	32.45	......	32.45s	......	.1361wI	......	.1133	......	.25
Kansas City	e	e	e	18.00d	......	20.40s	......	.0925cwJ	......	.0825c	0.125c	......
Los Angeles	e	......	e	22.50dms	......	21.00dsz	......	24.00dzK	......	23.0[illegible]ds	.1038	.2038
Minneapolis	......	......	3.73h	29.50	......	29.50v	......	0.125w	......	0.115	.134	......
Montreal	e	e	e	32.50n	44.80n	.176n	.226n	18.70nuE	23.70nuE	.154n	.242ns	.27ns
New Orleans	......	......	......	20.00e	......e	20.00ev	......e	.095ew	......e	.085B	.095BL	......
New York	......	......	3.70f	26.89qCD	47.32qD	26.89stCD	47.32stD	.1273wCDF	.2139wDF	......	.1273CD	.2168D
Philadelphia	175/185	110/120	4.06	24.00	......	24.00	......	.11uF	......	.105	......	......
Pittsburgh	60.00k	99.12ln	6.35	28.30i	......	30.90iv	......	.1351i	......	.14‡	.1351i	......
St. Louis	......	......	......	22.90f	......	.1825	......	.1035fwM	......	0.165	.825	......
San Francisco	......	70.00e	......	24.50g	41.50g	24.50gkv	41.50gkv	25.50gN	43.00gN	25.25vg	25.50yv	.206y
Seattle	......	......	......	27.00z	40.50h	27.00z	......	28.50K	......	24.75hv	.10h	.11hr
Toronto	......	125.50	4.50	40.10	59.38	0.2004	0.2445	0.214w	0.258w	0.198	0.216	.271

‡ Delivered.

PAVING BRICK & BLOCK: *b 3 x 3¾ x 8. *c 2¼ x 8¼ x 4. *d LCL, truck deliveries. *e Not used. *f 2" interior 8¢ treat. *g 3" *h 2" tr, 8¢ *i 3 x 3⅝ x 8½. *j 2½", 6 lb. tr. *k Used. *l Redshale; clay $101.32. *m Pine; oak $6.57. *n Truck del.

ASPHALTS: *a Price at plant, Everett, Mass. *b F.o.b. refinery, Lockport, Ill. *c F.o.b. Sugar Creek, Mo. *d F.o.b. refinery, El Segunda. *e F.o.b. Baton Rouge. *f F.o.b. Wood River, Ill. *g F.o.b. Richmond, Calif. *h F.o.b. Martinez. *i F.o.b. refin ry, Baltimore. *j F.o.b. refinery, Inglewood, Calif. *k 50–110 penetr. *l Less than 100 penetr. *m 40/80 penetr. *n Fed. tax included; add 5% for mun. & prov. *o Drums not avail. Shipped in steel bbl. *p 60/70 penetr. *q 40/300 penetr. *r In customer's drums. *s Shipped in drums, per drum. *t 85/300 penetr. *u Per 100 gal. *v Per ton. *w Per gal. *x Also tank trucks. *y F.o.b. Oakland. *z F.o.b Edmonds. *A F.o.b. refinery, Cleveland. *B F.o.b. Destrehan, La. *E RC. *F Also RC. *G Also MS, SS. *H RC 0–5 incl. *I MC 4. *J MC, RC $0.095 *K MC 3, 4 & 5. *L MS. *M MC 1–5, RC 1–5, $0.106. *N MC 3 *O Truckload. *P F.o.b. refinery Savannah: $0.09/gal., tank cars; $0.20/gal., drums. *Q F.o.b. Eldorado, Ark.

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A MESSAGE TO AMERICAN INDUSTRY • ONE OF A SPECIAL SERIES

BASIC RESEARCH . . .

More Practical Than You Think

This editorial, one of a special series on the importance of research to the American economy, deals with an aspect of our research program that may have serious consequences in future years — the lag in basic research.

An earlier editorial in this series noted: "The keen interest of U. S. business firms in scientific research points the way to a new kind of prosperity for our economy — a prosperity based on deliberate creativeness." As a result of the dramatic increase in industry's research expenditures, more new products will be introduced in the years 1957-1960 than in any previous four-year period.

A steady stream of new products and new processes means better values for consumers and lower costs for business. And thus it promises to sustain a high level of general prosperity that defies the old laws of boom and bust. **But, as we look further ahead, there is a danger that the stream of research discoveries may run dry because of our neglect of basic research.**

This danger was described by John Jay Hopkins, late founder and chairman of the General Dynamics Corporation: "Unless there is a revolutionary development in America of pure, not applied, science, there will come a day when there is no use in trading in your old car; because the new one is no better. The only difference between this year's television set and next year's will be the appearance of the cabinet! Scientific progress will be replaced by scientific stagnation."

What Basic Research Is

Basic (or pure) research has been characterized as the pursuit of knowledge for its own sake rather than to fulfill some practical objective. It is generally carried out in an environment which allows the investigator the freedom to follow the lead of his curiosity. The scientist in basic research, in the words of Glenn T. Seaborg of the University of California, is not concerned with "utilitarian goals, but a search for deeper understanding of the universe and the living and inorganic phenomena within it."

Impractical as basic research may seem in its initial purpose, it is an essential prerequisite to applied research and product development. A few examples will show how some of the greatest technical advances of recent years have come from basic research projects that had no immediate practical objective:

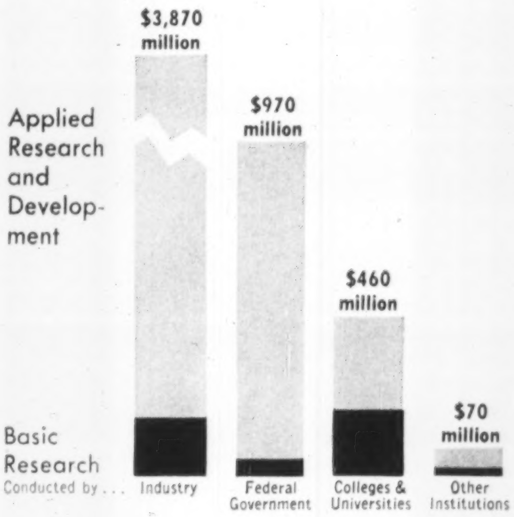
● **Radar** — an important military development of World War II with broadening commercial applications — was the outgrowth of a basic research project whose purpose was to obtain information about the height of the ionosphere, the layer of air that lies some 25 miles above the earth's surface.

● **Transistors** — the miniature devices which are already vital components of hearing aids, pocket radios and a wide variety of industrial equipment — were invented at Bell Laboratories (research subsidiary of the American Telegraph and Telephone Company) following university investigations into the electrical behavior of solids.

● **Neoprene** — a synthetic rubber — was developed by duPont with the help of basic information provided by Father Nieuwland of Notre Dame, who discovered he could control the polymerization (the linking together of molecules) of a certain class of organic compounds.

● **Nylon** — the first of the noncellulosic synthetic fibers that have revolutionized the textile industry — grew out of fundamental research by Dr. Wallace Carothers on long-chain polymers.

Only 8% of All Research and Development in the U. S. is Devoted to Basic Research



Data: National Science Foundation, "Funds for Basic Research in the United States, 1953"

Industry's Stake in Basic Research

Industry traditionally has relied upon colleges and universities and other nonprofit institutions for basic research; and the U. S. has long benefited from the greater emphasis placed on basic research in Europe. It is conventional to think that business cannot, and should not, do much about "ivory tower" projects which do not have immediate practical application.

However, there is not so much in this idea as is supposed. The examples above illustrate what Caryl Haskins, president of the Carnegie Institution, has called "the widespread paradox that the most important practical consequences are commonly the least sought after." Furthermore, it is certain that, without adequate basic research, industry's efforts to produce new and better products will become progressively more difficult. And our national defense, in an age of breathtaking military applications of science, will become increasingly precarious.

In the past, our economic growth came largely through expansion into new lands or through discovery and development of rich deposits of natural resources. Such opportunities are relatively limited today. The great opportunities now lie in discovering new materials and new properties of the materials we already have. **This is the job of basic research, and industry has a vital stake in it.**

The chart indicates the tiny share of research efforts in the U.S. that is devoted to basic research. **Only 4% of all research by industry, and only 8% of all research in the U.S., during the year 1953** (the latest for which information is available) **represented fundamental research to add to overall scientific knowledge.** Even in colleges and universities less than half the research performed is basic research. At least one Nobel Prize winner has expressed the belief that we need and should work toward a doubling of the proportion of our total research effort that is devoted to basic research as soon as possible.

What Business Can Do

Without anything like a staggering increase in the total cost of its research programs, industry could do much to expand our basic research effort. Companies with big research programs should, as a matter of successful survival, be devoting a share of the effort in their own laboratories to basic research. Significantly, companies that are already doing a notable job of basic research have also made an outstanding record of translating such research into new products for industry and the consumer.

Smaller companies may rightly regard the conduct of research projects with uncertain prospects of reward as a luxury. Some basic research, indeed, never results in any tangible payoff. But, with modest contributions, small companies can still have a part in the advance of basic research. They can join together with other companies on cooperative projects. They can support basic research through trade associations and technical societies. They can help research centers in universities and other nonprofit institutions. Arrangements are available in some instances whereby business firms can pay a fee to have access to work done by university researchers.

One way or another, it is up to private business firms to see that basic research moves forward. By doing so they will be laying the groundwork for the development of the new products and technology on which their growth, and the growth of the economy, depend.

This message is one of a series prepared by the McGraw-Hill Department of Economics to help increase public knowledge and understanding of important nation-wide developments. Permission is freely extended to newspapers, groups or individuals to quote or reprint all or parts of the text.

Donald C McGraw
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Oklahoma City, Okla. — Installing 30″ cast iron pipe for floodway siphon in municipal sanitary sewer system.

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Construction Reports

Bids Asked—Low Bidders—Contracts Awarded—

Compiled by Business News Department—Engineering News-Record, 330 W. 42nd St., New York 36, N. Y., ELSIE EAVES, Manager
J. A. MAHONEY, M. WETZEL, M. E. SCIORRA, D. TARTAGLIA, Reports
J. H. WEBBER, M. R. ROESSLER, E. R. HUBER, Statistics.

NEW ENGLAND

HEAVY CONSTRUCTION—BA

Conn., **New Milford**—BA 12/10—Town of New Milford Sewer Comn., Main St., sewerage treatment plant. $400,000. Frederick Ferris, c/o owner, engr. Bids rejected 4/30. LB **$499,950**. CD 5/23, under LB.

† **Me., Limestone**—DORMITORY MODIFICATION—BA On Or About 12/18—U. S. Eng., 150 Causeway St., Boston, Mass., modification of airmen's dormitory, Nike Battalion Headquarters, Loring Air Force Base, ENG-19-016-58-59. CD 9/17.

BUILDINGS—BA

Mass., **Brookline**—HOUSING—BA 12/11—Brookline Housing Auth., 226 High St., Brookline, SAHP-1, housing for the elderly (60 units), Manor St. $600,000. Plans deposit $100. Isidor Richmond & Carney Goldberg, 16 Arlington St., Boston, archts. CD 12/19.

HEAVY CONSTRUCTION—LB & CA

▲ **VERMONT**—State Hy. Dpt., State House, Montpelier,
E. T. **O'Neil & Sons Constr. Corp.**, 223 Commercial St., Holyoke, Mass. CA **$1,043,303**, est. $1,025,000 (8 bidders) grading, drainage, sub-base and 2.037 mi. bit. concrete and a 1 span welded composite girder bridge over Clarendon River, a 2 span (each 72 ft. center to center of bearings) composite WF beam bridge over Otter Creek and 1 span through plant girder railroad overpass in towns of West Rutland-Rutland ST 65 (L). Bids Nov. 15. CD 11/19, under LB.

▲ **MASSACHUSETTS**—Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston,
M. **DeMatteo Constr. Co.**, 200 Hancock St., Quincy, Mass. CA **$1,635,329**, est. $2,019,486, Granite St. Interchange, incl. bridges and culverts, Rte. 128 relocation, U-229 (14), Braintree. Bids Oct. 29. CD 10/31, under LB.

MASSACHUSETTS—Commonwealth of Mass., Dpt. P. Wks., 100 Nashua St., Boston, Bids opened 11/19,
B. J. **Pentabone Co.**, 143 Rumford Ave., Newton, Mass. LB **$104,567**, est. $114,554, hy. reconstr., Rte. No. 9, Framingham. CD 11/8.

A. E. **Bragger Constr. Co.**, Bragger St., Warwick, R. I. LB **$235,240**, est. $225,000. well chambers pipe line, etc. (water) WOONSOCKET, R. I. City, Purchasing Agent, City Hall, Woonsocket, R. I. Metcalf & Eddy, Statler Bldg., Boston, Mass., engrs. Bids Nov. 14. CD 2/8/45.

Della Bitta-Bassola, Inc., Werking St., Plantsville, Conn. LB **$63,629** (5 bidders) excavation for Hat Shop Bridge, Housatonic Ave. and Channel, back fill existing channel, remove old bridge and clean site, NEW MILFORD, CONN. Town of New Milford, Town Hall, New Milford, Conn. CD 5/31/56.

BUILDINGS—LB & CA

Ley Constr. Co., 124 State St., Springfield, Mass. CA **$96,000**, WAREHOUSE and OFFICE addn., Bank St., SPRINGFIELD, MASS. Charles Wilbar & Sons, Inc., 26 Willow St., Springfield, Mass.

Owner, c/o Gaquin Real Estate Co., 310 Main St., Wakefield, Mass., Separate Contracts. Approx. **$360,000**. RESIDENTIAL DEVELOPMENT, 13 houses "Briarwood", MacArthur Rd., STONEHAM, MASS.

Town of Weymouth, Supt. Schools, 111 Middle St., East Weymouth, Mass, rejected bids Oct. 26, ELEMENTARY SCHOOL, Green St., North Weymouth, WEYMOUTH, MASS. LB **$513,630**. Will re-advertise. CD 11/4, under LB.

▲ W. J. **Barney Corp.**, 101 Park Ave., New York, N. Y. CA Approx. **$1,000,000**, 100,000 sq. ft. RESEARCH BLDG., GROTON, CONN. Charles Pfizer & Co., Inc., Eastern Point Rd., Groton, Conn. Shreve, Lamb & Harmon, 11 E. 44th St., New York, N. Y., archts. Awarded Nov. 19.

W. J. **Megin, Inc.**, 51 Elm St., Naugatuck, Conn. LB Approx. **$500,000**, (7 bidders) 50,000 sq. ft., steel frame, 350 railroad siding WAREHOUSE, Canal St., SHELTON, CONN. B. F. Goodrich Co., 500 S. Main St., Akron, O. CD 8/26.

▲ W. J. **Megin, Inc.**, 51 Elm St., Naugatuck, Conn. LB **$3,146,413**. (6 bidders), 2 HOSPITAL WINGS, addns., NEW LONDON, CONN. Lawrence & Memorial Associated Hospitals, Montauk Ave., New London, Conn. Bids Nov. 19. CD 11/14.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

† N. Y., **Mitchel Field**—LIGHTING SYSTEM—BA 12/9—Base Procurement Office, Bldg. No. T-117, Mitchel Air Force Base, replacing existing lighting system on Runway 2-30 with high intensity lighting system, Mitchel Air Force Base, Proj. No. 30-601-58-21. CD 9/17.

N. Y., **Clarence**—BA 12/11—Town, Town Hall, Clarence Circle, water lines in District 2. $350,000.

N. Y., **New York**—TRACKS—BA 12/13—New York City Transit Auth., 370 Jay St., Brooklyn, Zone 1, installing tracks and contact rail, connection between IND Concourse Yard and IRT Jerome Ave. Line, Bronx Boro, Contr. T-128. Plans deposit $6. CD 8/31/45.

BUILDINGS—BA

N. Y., **Amherst**—SCHOOL—BA 12/12—Amherst Central School Dist., 4301 Main St., Snyder, Junior High School addn. and other facilities. $775,000. Wm. C. Lurkey, 997 Main St., Buffalo, archt. CD 8/12.

D. C., **Wash.**—HOSPITAL—BA 12/18—Children's Hospital, 2125 13th St. N.W., expansion and remodeling of hospital. Faulkner, Kingsbury & Stenhouse, Ring Bldg., archts. Plans deposit $75. CD 8/26.

† N. Y., **Brooklyn**—CHAPEL—BA On Or About 1/2—Veterans Admin., Munitions Bldg., Wash. 25, D. C., Proj. 31-5568, chapel bldg., Veterans Hospital. $100,000-$500,000. Robert J. Reilly & Assoc., 45 W. 45 St., New York, Zone 19, archts. CD 8/21/47.

HEAVY CONSTRUCTION—LB & CA

B-B Electrical Contractors, Inc., 280 Vreeland Ave., Paterson, N. J., LB **$465,510**, T-4, north extension of the Barnhart-Adirondack 230 kilovolt transmission lines, NEW YORK. Power Auth. of State of New York, Coliseum Tower, 10 Columbus Circle, New York, 19, N. Y. Bids Nov. 12. CD 11/12.

Westinghouse Electric Corp., 40 Wall St., New York, N. Y., LB **$101,550**, TP 11, furnishing, del. 15 kv metalclad switchgear, Barnhart-Plattsburgh Transmission Proj., NEW YORK. Power Auth. of State of New York, The Coliseum Tower, 10 Columbus Circle, New York, 19, N. Y. Bids Nov. 21. CD 11/12.

▲ **NEW YORK**—State Dpt. P. Wks., The Gov. Alfred E. Smith State Office Bldg., Albany, N. Y.
Bero Constr. Corp., Waterloo, N. Y., CA **$3,492,117**, est. $3,894,000 viaduct substructure in City of Lackawanna. Arterial Rte. Fuhrman Blvd.-Hamburg Turnpike Viaduct etc., Proj. U-750 (12), Erie Co. Bids Oct. 10, awarded Nov. 13. CD 10/14, under LB.

NEW YORK—State Dpt. P. Wks., Gov. Alfred E. Smith State Office Bldg., Albany,
H. L. **Baughman, Inc.**, 1240 Jefferson St., Rochester, N. Y., CA **$810,631** est. $878,000 c. conc., b. conc. 1.21 mi., incl. bridge Falconer Village, Proj. F-449 (7) District 5, Chautauqua Co. Bids Oct. 10, awarded Nov. 7. CD 10/14, under LB.

▲ **Malan Constr. Corp.**, 2 Park Ave., New York, N. Y. LB **$2,800,000**. construction, elevator, heating, ventilating, air-conditioning, plumbing, electric, sewage treatment and site development work at two restaurants and two gas stations for State Thruway Auth., Berkshire Section, Rensselaer Co., NEW YORK. State Dpt. P. Wks., Gov. Alfred E. Smith State Office Bldg., Albany, N. Y.

Dpt. P. Wks., Municipal Bldg., New York 7, N. Y., cancelled bids to have been opened Nov. 1, new lighting system, incl. new lighting distr. panelboards and other electrical work in Water St. Garage, Water and Front Sts., BROOKLYN, N. Y. CD 10/23.

Zephyr Constr. Co., 7412 New Utrecht Ave., Brooklyn, N. Y., LB **$879,000**. Contr. I-T-12, structures and equipment, for sludge thickening tanks appurtenances, Tallmans Island Pollution Control Proj., WHITESTONE, N. Y. Dpt. P. Wks., Municipal Bldg., New York 7, N. Y. Bids. Oct. 30. CD 10/25;
W. E. **Blume, Inc.**, 308 Putnam Ave., Brooklyn 16, N. Y. LB **$87,343**, Contr. I-T-15, electrical work; for Tallmans Island Pollution Control Proj. (Whitestone, N. Y.).

NEW JERSEY—New Jersey Hy. Auth., John B. Townsend, secy., Red Bank,
M. J. **Starola, Inc.**, P. O. Box 482, Red Bank, N. J., CA **$757,349**, Garden State Parkway, Contr. No. 325, Sect. 7, imprv. Southbound Roadway and shoulder stabilization from Keyport to Asbury Toll Plaza, New Shrewsbury Borough, Middletown, Holmdel and Raritan Twps., Monmouth Co. Bids Oct. 31, awarded Oct. 31. CD 10/16.

NEW JERSEY—State Hy. Dpt., 1035 Parkway Ave., Trenton, Bids opened 11/19,
J. **Vinch & Sons, Inc.**, 28 Jeanette Ave., Trenton, N. J., LB **$106,514** (7 bidders), constr. 0.379 mi. South Olden Ave. extension from Shady Brook to Fetter Ave., Mercer Co. CD 11/1.

▲ **PENNSYLVANIA**—State Hy. Dpt., 506 North Office Bldg., Harrisburg,
Marsolino Constr. Co., 309 Fayette National Bank Bldg., Uniontown, Pa. CA **$1,159,950**, 23,621 ft. divided of crushed aggreg. base with bit. 1 bridge T. R. 51, N. Union, Franklin and Menallen Twps., Fayette Co.; CA **$2,259,823**, 28,525 ft. divided hy. crushed aggreg. base with bit. 1 bridge, T. R. 51, Menallen and Franklin Twps., Fayette Co. Bids Sept. 27, awarded Nov. 20. CD 10/2, under LB.

▲ **MARYLAND**—State Rds. Comn., 108 E. Lexington St., Baltimore, Zone 2,
Richard F. Kline, Frederick, Md., CA **$1,622,363**, grading, drainage, surf. 2.25 mi. Frederick By-Pass Interchanges near Frederick, F 490-12-720, Frederick Co. Bids Oct. 22. CD 10/25, under LB.

Bright-Shepard Co., Inc., 5105 Cresten St., Tuxedo, Md. CA **$718,075**. Contract S-963, street imprvs. along Cameron St., Silver Spring, ROCKVILLE, MD. Dir. P. Wks., Montgomery Co., County Office Bldg., Rockville, Md. Bids Nov. 6, awarded Nov. 15. CD 11/13, under LB.

B. & **W. Constr. Co.**, 2 Riverside Rd., Baltimore 21, Md., LB **$121,415** (7 bidders), Contract 5738-R, Group bids, road imprvs. various sections, TOWSON, MD. Baltimore County Executive, County Office Bldg., Towson 4, Md. Bids Nov. 12. CD 11/8.

BUILDINGS—LB & CA

▲ F. D. **Rich Co.**, 322 Main St., Stamford, Conn. LB **$3,071,600**. (12 bidders) general construction STATE OFFICE BLDG. addn. to State Education Bldg., ALBANY, N. Y. State Dpt. P. Wks., The Gov. Alfred E. Smith State Office Bldg., Albany, N. Y. Bids Nov. 21. CD 10/14;
Tougher Heating & Plumbing Co., 175 Broadway, Menands, N. Y. LB **$763,955**. (9 bidders) heating work for state office bldg. addn. to state education bldg. (Albany, N. Y.);
Progressive Electric Contg. Corp., 39-17 24 St., Long Island City, N. Y. LB **$584,000**. (9 bidders) electrical work for state office bldg. addn. to state education bldg. (Albany, N. Y.)

▲ **Turner Constr. Co.**, 150 E. 42 St., New York 17, N. Y., CA Est. **$15,000,000**. 17 story limefaced OFFICE with sub-bsmnt. GARAGE, Riverside Dr., 119 and 120 Sts., NEW YORK, N. Y. National Council of Churches, of Christ in U. S. A., 297 Fourth Ave., New York, N. Y. CD 2/3/56.

Orchard Estates, c/o C. J. Kordys, archt., 116 Passaic St., Passaic, N. J., Owner Builds. **$345,000**. 18 HOMES, Orchard Place and North Finley Ave., BASKING BRIDGE, N. J.

The Ferber Co., 16 Johnson Ave., Hackensack, N. J. CA **$100,000**. 1 story, masonry furniture WAREHOUSE, Hackensack Ave. and State Hy. 4, HACKENSACK, N. J. Huffman & Boyle, State Hy. 4, Hackensack, N. J.

(Continued on page 134)

PROJECTS COVERED

By Size

Construction projects here reported cover the United States and Canada, are of these minimum sizes or larger: water supply, earthwork, waterways $44,000; other public works $73,000; industrial buildings $93,000; other buildings $344,000. Also Foreign projects of $100,000 and more in size of interest to American contractors.

By Regions & Classes of Construction

(In order of Listing)

BIDS ASKED
LOW BIDDERS
CONTRACTS AWARDED

New England
Middle Atlantic
South
Middle West
West of Mississippi
Far West

PROPOSED WORK
Water Supply
Sewers, Waste Disposal
Bridges
Streets & Roads
Earthwork, Waterways
Public Buildings
Mass Housing
Commercial Buildings
Industrial Buildings
Unclassified

In These Stages

PROPOSED WORK: Before and including appointment of engineers or architects.

BIDS ASKED: BA (new announcements only). For full calendar, see also preceding issues.

SOON LETS CONTRACT: SLC

LOW BIDDERS: LB On jobs below $500,000 in value all low bidder news will be the final reports published on the projects involved except where award is not made to the low bidder. In this case, a supplementary contract award report will be published.

CONTRACTS AWARDED: CA Except awards to low bidders previously reported in low bidder stage.

CD dates shown are of Construction Daily Issue in which last previous report was published.

OWNERS, ENGINEERS, ARCHITECTS, CONTRACTORS are invited to report their new jobs for listing in these reports when they meet or exceed the size minimums shown above. Address these news releases to J. A. Mahoney, REPORTS, ENGINEERING NEWS-RECORD, 330 W. 42 St., New York 36, N. Y.

Symbols and Abbreviations Include:

†	Federal Government
▲	Project of $1,000,000 or over.
ENR	Engineering News-Record
CD	Construction Daily

For additional reports see Construction Daily.

Tru-Stop Brakes

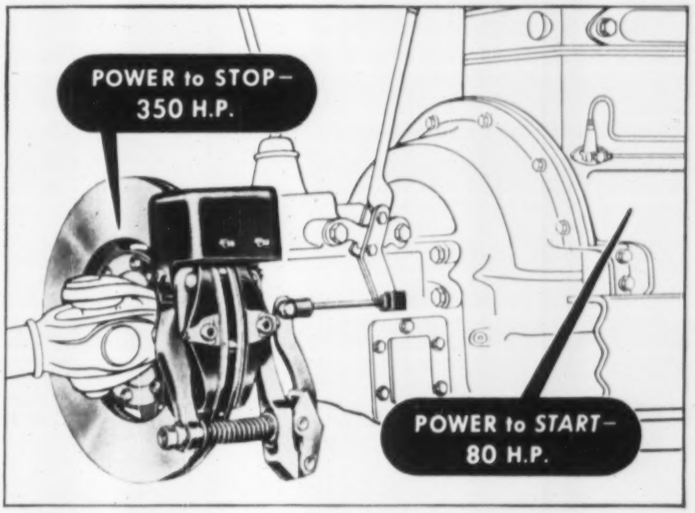
Meet Every Heavy-Duty Safety Requirement

OFFER POSITIVE PROTECTION AGAINST RUNAWAY OR PARKING ACCIDENTS—AT LOWEST COST

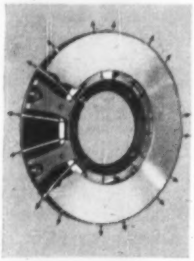
HERE IS WHY:

They have surplus power required for emergency service—no dangerous self-energizing

TRU-STOP Heavy-Duty Emergency Brakes are not only excellent parking brakes. They serve as a complete, independent and fully reliable braking system. Operating on the propeller shaft they enable the driver to continue on safely in the event of service brake failure. TRU-STOP brakes have the surplus braking capacity to be used *repeatedly* as an auxiliary to service brakes.

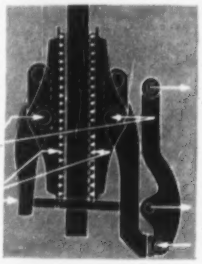


Brakes actually do more work than the engine in terms of horsepower Where it takes 80 HP to accelerate to 20 miles per hour, it takes 350 HP to make a safe stop from 20 miles per hour within required limits



Ventilated to throw off heat

Brake efficiency depends on ability to throw off intense heat—rapidly. Discs of TRU-STOP brakes are exposed to the air even during the braking operation. Ventilated design circulates air *between* the disc plates.



Give uniform brake pressure

Disc of TRU-STOP brakes is "squeezed" between the flat surface of the shoes. Effort applied to brake lever operates front and rear lever arms simultaneously. Pressure is exerted on the center of each shoe. Entire lining surface is in contact.

FOR SAFE, ECONOMICAL, HEAVY-DUTY BRAKING WITH MAXIMUM LIFE AND MINIMUM MAINTENANCE

TRU-STOP Brakes are used on a great variety of mobile and stationary equipment

SUCH AS—

- Motor cranes
- Road rollers
- Dump trucks
- Power dividers
- Cooling tower fans
- Oil well pumps
- Cold header presses
- Scrubbing machines
- Wire rope stranders
- Fork lift trucks
- Motor scrapers
- Tractors
- Graders
- Diamond core drills
- Electric locomotives
- Oil well servicing rigs
- Railway inspection cars
- Shapers
- Power take-offs
- Winches
- Motor shovels
- Tractor loaders
- Conveyors
- Hard rock drill positioners
- Mine locomotives
- Power presses
- Railway power ballisters
- Cable tool spudders
- Aerial tram cars
- Tension wire stringers

We will be glad to answer any questions or give you more detailed information about TRU-STOP Heavy Duty Emergency Brakes. Send for

Catalogs DH-33 and DH-530

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BRAKES

Automotive and Aircraft Division
AMERICAN CHAIN & CABLE

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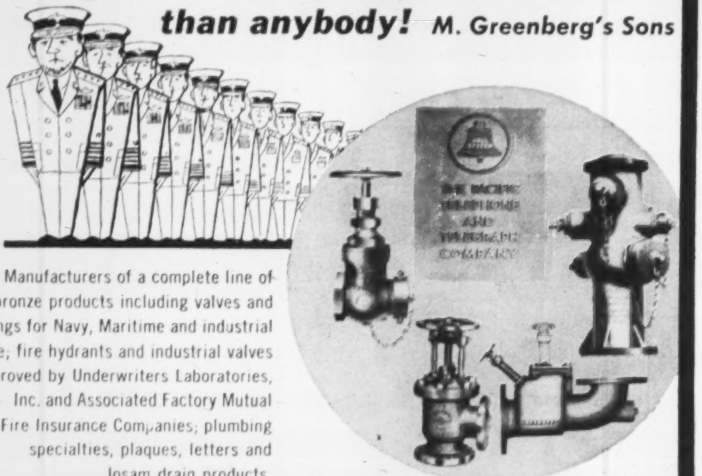
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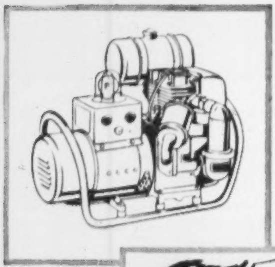

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GENERATING SETS • WATER SYSTEMS • MAGNETOS •
PUMPS • MOTORS • SCALES • DIESEL LOCOMOTIVES AND ENGINES

(Continued from page 132)

L. F. Fellgraff, 577 Teaneck Rd., Ridgefield Park, N. J., archt.

Fairview Knolls Homes, c/o C. J. Kordys, archt., 116 Passaic St., Passaic, N. J., Owner Builds, **$345,000,** 19 HOMES, at Fairview Knolls on Park Ave., PARK RIDGE, N. J.

▲ **H. B. Alexander & Son, Inc.,** 315 Vaughn St., Harrisburg, Pa. LB **$1,464,797** general constr. PATIENTS BLDG. and DIETARY SERVICE UNIT for Harrisburg State Hospital, HARRISBURG, PA. General State Auth., 18 and Herr Sts., Harrisburg, Pa. Bids Nov. 20. CD 10/17.

▲ **Victor Beauchamp, Inc.,** 431 Cedar St. N.W., Wash., D. C. LB **$1,397,497.** (15 bidders) DORMITORIES, Worcester Hall, women's dormitory; Cecil Hall, men's dormitory; Frederick Hall addn.; Dorchester Hall, women's dormitory, COLLEGE PARK, MD. University of Maryland, College Park, Md. Bids Nov. 21. CD 10/30.

Dorset Contg. Co., Inc., 427 "O" St. S.W., Wash., D. C. LB **$483,000,** Dorchester Hall (College Park, Md.)

Hill & Kimmel, Inc., 8248 Georgia Ave., Silver Spring, Md. LB **$436,681.** Worcester Hall (College Park, Md.)

Joseph Nebel Co., 3408 Wisconsin Ave. N.W., Wash., D. C. LB **$478,000.** (5 bidders) constr. Friendship Branch OFFICE, Wisconsin Ave., WASH., D. C. Riggs National Bank, 1503 Pa. Ave. N.W., Wash., D. C. Mills, Petticord & Mills, 3308 14th St. N.W., Wash., D. C., archts. Bids Nov. 19. CD 11/4.

SOUTH

HEAVY CONSTRUCTION—BA

† **Fla., Pensacola**—NAVAL AIR STATION IMPRVS.—BA 12/12—Officer in Charge of Constr., Bldg. 45, U. S. Naval Air Station, Pensacola, altering aviation fuel system, ALF Ellyson, Pensacola, NBy-8763, Spec. 8783/57; installing closed head sprinkler system, Bldg. No. 655, U. S. Naval Air Station, Pensacola, NBy-8784, Spec. No. 8784/57. CD 9/17.

Ky., Morehead—BA 12/12—City, City Hall, sewage treatment plant; Contract 6—general contract; Contract 7—plumbing, heating; Contract 9—electrical work. Over $500,000. Plans deposit $35. The Chester Engineers, 210 E. Parkway, Pittsburgh, Pa., engrs.

† **Louisiana**—BA 12/17—U. S. Eng., foot of Prytania St., New Orleans, restoration and slope pavement to Blythe Boulevard Levee, Orleans Parish, Inv. No. 58-119.

N. C., Littleton—BA 12/18—Town, D. A. Ross, mayor, Town Hall, Div. 1, sewage treatment plant, exten. sanitary sewerage system; Div. 2, sewage lift station and force mains. Plans deposit $25 each division. L. E. Wooten & Co., 306 S. Dawson St., Raleigh, engrs.

La., Mandeville—BA 12/19—Town Council, Mandeville, approx. 18 mi. street paving imprvs. Plans deposit $35. J. M Fourmy, Hammond, engr.

BUILDINGS—BA

▲ **Fla., McClenny**—STATE HOSPITAL—BA 12/12—Bd. Comrs. State Institutions, 33 Adams St., Roosevelt Hotel, Jacksonville, Phase 3, 1 story, 178x242 ft. 1 story, 72x144 ft., 1 story, 112x208 ft., 1 story, 148x168 ft., 1 story, 52x175 ft., 1 story, 40x245 ft., 1 story, 10x16 ft, all CB-S and brick, air-conditioned. Northeast Florida State Mental Hospital. Plans deposit $65. Reynolds, Smith & Hills, 227 Park St., Jacksonville, engrs.-archts.

Miss., Gulfport—HOUSING—BA 12/19—Miss. Regional Housing Auth. No. VIII, Gulfport, low-rent housing consisting 46 dwellings, management-maintenance community building, Proj. No. Miss. 40-4A; low-rent housing consisting 51 dwellings, management-maintenance community building, incl. well supply plants; pumps, pump houses and connections to water distr. plans, Proj. No. Miss. 40-4B. William I. Rosamond, 1715 24th Ave., archt.

HEAVY CONSTRUCTION—LB & CA

▲ **VIRGINIA**—Commonwealth of Va., Dpt. Hys., 1221 E. Broad St., Richmond, Bids opened 11/20,

Va.—**Rogers Bros. Constr. Co.,** Cedar Bluff, Va. LB **$94,797.** (6 bidders) 2.67 mi. 16 ft. various soil aggreg. bit. surface treatment Rte. 645, 621 beginning Int. Alt. Rte. 58 (near Ben Hur) ending 2.67 mi. east of Alt. Rte. 58, State Proj. 0645-052-007, Old State Proj. 1352-07, Fed. Proj. S-1029 (1) Lee Co.;

Va.—**McAlister Constr. Co.,** 3306 Pineland Rd., Roanoke, Va. LB **$90,387** (2 bidders) 35 mi. 24 ft. x 20 ft. soil aggreg. bit. conc. top Rte. 460 beginning at 6.71 mi. S. Interstate Section of Rte. 83 (Vansant) ending at 7.06 mi. S. Intersection Rte. 83 (Oakwood), State Proj. 0460-013-014, Old State Proj. 1913-14, Fed. Proj. ER-10 (2) Buchanan Co.;

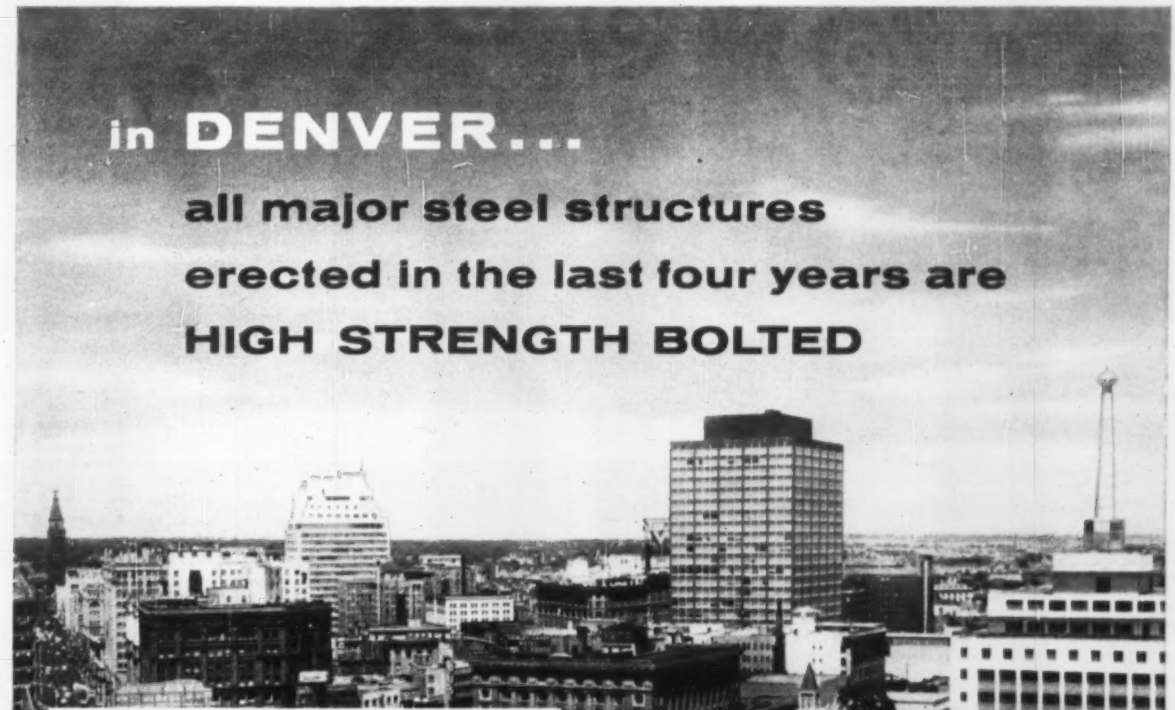
Va.—**C. H. Lawson, Inc.,** Box 186, Williamsburg, Va. LB **$149,407.** (12 bidders) 3.94 mi. 22 ft. x 8 in. soil aggreg. bit. surface treatment and bridge Rte. 205 beginning 5.45 mi. E. Interstate Rte. 301 ending WCL Colonial Beach, State Proj. 0205-048-003; 0205-096-005-007, Old State Proj. 2748-03; 2796-050-07, Fed. Proj. S-940 (2) King George and Westmoreland Counties;

Va.—**E. W. Woolfolk,** Box 267, Bowling Green Va. LB **$105,117.** (5 bidders), 1.94 mi. 20 ft.-36 ft. and bariour bit. surf. treatment Rte. 14 beginning at .10 mi. S. Int. Rte. 602 ending 0.05 mi. S. Int. Rte. 604 (Susan P.O.) Mathews Co.;

Va.—**B. G. Young & Sons, Inc.,** Lamont St., Johnson City, Tenn. LB **$1,932,737.** (18 bidders), 3.49 mi. 2 lanes 24 ft. x 7½ in. c. conc. and bridge Rte. 402

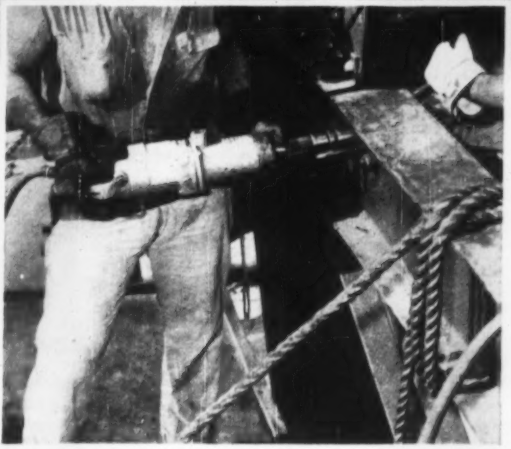
(Continued on page 136)

BOLTED CONSTRUCTION IS "GOING UP" EVERYWHERE



in DENVER...

all major steel structures erected in the last four years are HIGH STRENGTH BOLTED



Using impact and holding wrenches, two-man teams can cut weeks from frame erection time.

EXCLUSIVE use of high tensile bolts in tall steel construction is a remarkable testimonial to this building improvement. Since Denver's code was revised to permit bolting as an alternate to riveting, every major steel structure, including the 28-story Murchison Tower, has been bolted.

Little wonder. Bolting cuts construction costs, makes stronger connections, is safer for the ironworker, eliminates riveting noise and complaints. It saves *weeks* of erection time on the average job.

RB&W...largest independent producer of high strength bolts for construction

RB&W high tensile bolts are a major factor in the zooming success of this new construction method. With quality conforming to ASTM A325 standards, they provide joints with optimum shear and tensile strength...assure a structure that's permanently tied together.

Ironworkers appreciate the clean threads that permit fast and easy finger-tightening before wrenching. Constructors approve the speed of assembly, the consistent fine quality.

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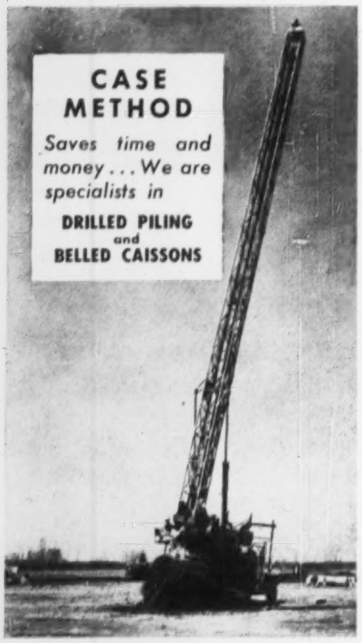
112th year

Plants at: Port Chester, N. Y.; Coraopolis, Pa.; Rock Falls, Ill.; Los Angeles, Calif. **Additional sales offices at:** Ardmore (Phila.), Pa.; Pittsburgh; Detroit; Chicago; Dallas; San Francisco. **Sales agents at:** Milwaukee; New Orleans; Denver, Fargo. **Distributors** from coast to coast.



In addition to replacing several piles with one belled caisson thereby eliminating a pile cap, belled caissons are replacing spread footings on more and more jobs because of the economies and the speed-up of the job.

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We appreciate the exacting, and excel in the unusual.

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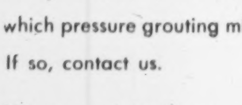

ELGOOD HYDRAULIC & MECHANICAL JACKS to 600 ton capacity

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SPECIAL APPLICATIONS

ELGOOD EQUIPMENT CORP.
373 TEN EYCK ST., BROOKLYN, N. Y., HY 7-5445

(Continued from page 134)

beginning at .48 mi. W. Int. Prop. Rte. 99 ending 0.36 mi. E. Int. Prop. Rte. 99 and 101, State Proj. 0402 077 001-002-005, Old State Proj. 8077-01-02-05, Fed. Proj. I-202-1 (14) Pulaski Co. CD 11/4.

VIRGINIA—Commonwealth of Va. Dpt. Hys., 1221 E. Breed St., Richmond.

cancelled bids to have opened Nov. 20, 4.45 mi. 24 and various x9 in., 8 in., 6 in., 4 in. soil. aggreg. base, bit. conc. top Rte. 58 beginning at 0.19 mi. W. of Int. Rte. 501 ending 4.57 mi. E. Turbeville P.O., State Proj. 0058-041-012-031-033-020, Old State Proj. 1741-12-31-20-33, Halifax Co. CD 11/4.

E. H. Glover, 5400 Leesburg Pike, Falls Church, Va. LB **$212,504**. Little Hunting Creek Secondary Sewage Treatment Plant, FAIRFAX, VA. Bd. Supervs. Fairfax Co., Fairfax, Va. Bids Nov. 19. CD 10/3.

▲† **Kaminer Corp.**, Box 227, Chamblee, Ga., LB **$1,357,547** radiation effects laboratory, Proj. 114-G-8, for Dpt. Air Force Plant No. 6, DAWSONVILLE, GA. Lockheed Aircraft Corp., Marietta, Ga. Bids Nov. 12. CD 10/1.

▲ **FLORIDA**—State Rd. Dpt., Tallahassee, Bids opened 11/20.

Wiley N. Jackson Co., R. F. D. 4, Roanoke, Va., LB **$2,141,263**, heavy grading and embankment; 6½ in. and 8½ in. Limerock base, primed; Type 1 asphalt concrete surf. course and binder course; 7 in. and 9 in. cement concrete pavement (plain) correcting ramps; drainage structures; constr. 4 concrete steel (rolled beam and plate girder spans) grade separation bridges on concrete oiers founded on prestressed concrete piles; electric lighting system, aluminum handrail; removal of existing bldgs. The length of bridges is 770.67 ft. the length of roadway (not incl. ramps and bridges) is 0.681 mi. length of projects is 0.758 mi. between Montana Ave. and Old St. Augustine Rd. in S. Jacksonville (Jacksonville Expressway) Fed. Aid Proj. No. 1-003-7-(15), Job No. 7202-478 and State Proj. Job No. 7207-176, SR. No. 5, 9 and 10, Duval Co. CD 11/4.

Bamber Contractors, Inc., Box 546, Denham Springs, La. LB **$92,605** (4 bidders) Old River Hoosier Creek Dam and spillway, Beauregard Parish, LOUISIANA, State Dpt. P. Wks., Baton Rouge, La. Bids Nov. 12. Bids 10/21 rejected. CD, under LB.

▲† **Hendry Corp.**, Rattlesnake, Fla. LB **$1,180,941**. dredging 7,291,000 cu. yd. channel thru Devil's swamp for Baton Rouge Harbor, Baton Rouge, Inv. 58-71, LOUISIANA. U. S. Eng., foot of Prytania St., New Orleans 9, La. Bids Nov. 8. CD 10/11.

Paul E. Riviere, Contractor, 17 St. Canal, Gretna, La., LB **$52,145**, water distr. sys. exten., GRAMERCY, LA. Town, Earl J. Deroche, mayor, Gramercy, La. Bids Nov. 4.

▲ **Keller Constr. Corp.**, 7900 Palm St., New Orleans, La. CA **$1,857,000**. (8 bidders), 10 m.g. water filtration plant, new raw water intake line and appurtenances, MARRERO, LA. Jefferson Parish Water Works Dist. No. 2, Marrero, La. Bids Nov. 6. CD 10/22.

Oliver Mayer & Sons Constr., 1115 Poland Ave., New Orleans, La. LB **$170,717**. (4 bidders) sub-surf. drainage Victoria Dr. from Delaware St. to Holiday Dr., NEW ORLEANS, LA. City Purchasing Div., Civic Center, New Orleans, La. CD 12/16/55.

† **Vest & Bartell Constr. Co.**, 4438 Appleton St., Cincinnati 9, O., LB **$116,548**, est. $67,449 (4 bidders), Section "C" remedial work, flood protection, consisting approx. 37,000 cu. yd. excav., drainage structure, 24- to 36-in. metal culvert, rein.-con. headwall, concrete flume, etc., Covington, CIVENG-15-029-58-29, KENTUCKY. U. S. Eng., P. O. Box 59, Louisville, Ky. Bids Nov. 13. CD 10/28.

BUILDINGS—LB & CA

▲ **James H. Stanton Constr. Co.**, 9001 Warnall St., Kansas City, Mo. LB **$4,434,000**. 273 HOUSING UNITS, Robins Air Force Base, No. 09-603-58-12, MACON, GA. Directorate of Procurement & Prod., Bldg. 1678, Robins Air Force Base, Macon. Bids Oct. 29. CD 10/7.

Watson & Yeargan Co., Box 117, Jesup, Ga., LB **$708,500**, Wayne County HIGH SCHOOL, JESUP, GA. Wayne County Bd. Educ., Court House, Jesup, Ga. Bids Nov. 12. CD 10/21.

▲ **Foster & Creighton Co.**, 722-726 1st Nat'l. Bank Bldg., Nashville 3, Tenn., CA **$5,184,700**; constr., wiring, plumbing of concrete, brick ADMINISTRATION BUILDING of University of Kentucky's new Medical Center, LEXINGTON, KY. Commonwealth of Ky., Div. Purchases, Capitol Annex Office Bldg., Frankfort, Ky. Bids Nov. 15, awarded Nov. 18. CD 11/21, under LB.

Schickli Constr. Co., 915 E. Jefferson St., Louisville, Ky., LB **$135,153** (22 bidders), 1 story, 104 x 210 ft., brick, concrete block back up WAREHOUSE and OFFICE, LOUISVILLE, KY. Dehler Bros. Co. Inc., 116 E. Market St., Louisville, Ky. Bids Nov. 21. CD 11/13.

▲ **Industrial Electric & Supply Co., Inc.**, 62 Auction Ave., Memphis, Tenn. CA **$2,974,000**. installing ELECTRICAL EQUIPMENT in switching plant, City Power Plant at MEMPHIS, TENN. City, City Hall, Memphis, Tenn Burns & Roe, 160 W. Broadway, New York, N. Y., consult. engrs. Bids Sept. 26. CD 10/4, under LB.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

† **Mich., Detroit**—ARTCC MODIFICATION—BA 12/12—Civil Aeronautics Admin., Federal Office Bldg., Kansas City, Mo., modification to ARTCC elec. sys. at Detroit Metropolitan Wayne County Airport, No. 3-58-22. CD 11/9/56.

BUILDINGS—BA

Mich., Dearborn—SCHOOL—BA 12/11—City, Dr. Grant Mackenzie, secy. Dearborn Schools, 5757 Neckel St., addn., alterations to Conrad Ten Eyck School, Edgewood and Carlisle Ave. Plans deposit $25. George D. Mason & Co., 409 Griswold, Detroit, Zone 26, archts. CD 5/7/56.

† **Ill., Great Lakes**—HOSPITAL IMPRVS.—BA 12/6—Dist. P. Wks. Office, Ninth Naval Dist., Bldg., 1-A, replacement of condensate tank and repairs to four boilers, Bldg. 58-H, Naval Hospital, NBy-12736, Spec. 12736/57. CD 9/16.

▲ **O., Lebanon**—SECURITY PRISON—BA 12/19—Ohio Dpt. P. Wks., State Dpts. Bldg., Columbus, Phase 2, Medium Security Prison for Ohio Dpt. Mental Hyegiene & Correction, incl. 5 cell blocks; hospital, auditorium-gymnasium and various service bldgs. $3,200,000. Bellman Gillett & Richards 518 Jefferson St., Toledo, archts. CD 9/27.

BUILDINGS—SLC

Ill., Summit—FACTORY—Mojonnier Bros. Co., 7425 59th St., soon lets contract, 1 story, 35,000 sq. ft. brick factory addn. $300,000. Johnson & Johnson, 111 W. Washington St., Chicago, archts.

HEAVY CONSTRUCTION—LB & CA

OHIO—Dpt. Hys., Columbus, Zone 15, rejected bids Oct. 29, Type T-30, B-35, and T-35, 7.88 mi. Proposals Nos. 1 to 3 (inclusive). Hamilton Co., LB **$101,455**. CD 11/12, under LB.

▲ **OHIO**—Dpt. Hys., Columbus, Zone 15,

O.—**S. J. Groves Constr. Co.**, Wesley Temple Bldg., Minneapolis, Minn., CA **$2,779,877**. Type T-71 and structures 5.856 mi. S.R. 1, Sections 0.00 26.51 (Village of Madison) I-1103 (15) Ashtabula and Lake Counties. CD 11/6, under LB;

O.—**W. L. Johnson Constr. Co. & Assoc.**, P. O. Box 6668, Bexley Station, Columbus, O., CA **$1,917,855**. Type T-71 and structures 4.943 mi. USR 40, Section 7.96, I-1097 (5), Randolph Twp., Montgomery Co.;

O.—**The Great Lakes Constr. Co.**, Box 2278, Brooklyn Station, Cleveland, O. CA **$2,743,753**. Type T-71 and structures 3.58 mi. SR 8, Section 11.17 (City of Canton) I 1093 (1). Plain and Canton Twps., Stark Co.;

O.—**The Ohio Eng. Co.**, 105 Sixth St., Lorain, O., CA **$796,000**. Type T-35, 11.925 mi. USR 23, Sections 12. 10-21.59, 22.41-23.04, F-453 (5) F-613 (9) Wyandot Co. Grand total $8,237,485. Bids Oct. 29. CD 11/12, under LB.

▲ **ILLINOIS**—State Div. Hys., Springfield, Bids opened 11/22,

Ill.—**Louis Scully Sons**, 6127 N. Hiawatha St., Chicago, Ill. LB **$1,689,875** (2 bidders) 5.65 mi. storm sewers in Cicero Ave. in Chicago, F. A. Rts. 99 and 121, Cook Co.;

Ill.—**McCalman Constr. Co.**, 619 Seeton St., Danville, Ill. LB **$400,791** (3 bidders) c. conc. 3.6 mi. Ill. 49 in Allerton east, Vermilion Co. CD 11/15.

▲ **ILLINOIS**—Dpt. P. Wks. & Bldgs., Div., Hys., Contennial Bldgs., Springfield, Bids opened 11/22,

Paschen Contr. Inc., 2739 N. Elston St., Chicago, Ill. LB **$1,094,155** (3 bidders) WF-beam grade separation structure (carrying East Ave. over Congress Street Expressway, C.T.A. and B. and O.C.T. railroad) spans 1 at 59 ft.-3½ in., 1 at 65 ft.-1½ in. and 1 at 57 ft.-5¼ in. and 1 at 56 ft. on East Avenue at the intersection with Congress St. Expressway in Oak Park, with exception of furnishing fabricating structural steel, also, incl. concrete paved approaches and reconstr. on Harrison and Garfield Sts., Sec. 3232-208VE Proj. 1-01-4 (36) F. A. I. Route 1 (Congress Street Expressway), Dist. 10, Cook Co. CD 11/15.

▲ **ILLINOIS**—Ill. State Toll Hy. Comn., 40 N. Wacker Dr., Chicago, Bids opened 11/21,

The Edward Gray Corp., 2233 Avenue "0", Chicago, Ill. LB **$2,798,909**, Contr. MA-1 and MA-2, 8 Maintenance bldgs., 4 on Tri State Tollway, 3 on N. Ill. Tollway, and 1 on E-W Tollway, Cook, DuPage, Kane, Lake and Winnebago Counties. CD 7/11.

ILLINOIS—Dpt. P. Wks. & Bldgs., Div. Hys., Centennial Bldg., Springfield,

Robert A. Black, Inc., 3912 S. Halsted St., Chicago, Ill. CA **$542,952**, concrete wid'n. 12.33 mi., concrete base course 0.85 mi. and of gran. 0.71 mi. embankment on Ill. Route No. 92 from Yorktown to approx. ½ mi. east of Walnut, Logan Co. Bids Nov. 11. CD 11/8.

MICHIGAN—State Hy. Dpt., John C. Mackie, Stevens T. Mason Bldg., Lansing,

Thornton Constr. Co., 1028 Ethel Ave., Hancock, Mich., CA **$563,250**, est. $660,000. aggreg. base course with prime and double seal 3.872 mi. M-35, SS 66041 C1-R (S 306 4) Ontonagon Co. Bids Nov. 13. CD 11/18, under LB.

BUILDINGS—LB & CA

Knowlton Const. Co., 1133 Columbus St., Bellefontaine, O. CA **$940,000**, 2 Mens and Womens DORMITORIES, ADA, O. Ohio Northern University, Ada, O. Bids Oct. 30. Britsch-MacElwane, 2450 Sylvania St., Toledo, O., archts. CD 11/12, under LB.

Dawson Evans Constr. Co., 5300 Vine St., Cincinnati, O. CA Approx. **$300,000**, REPAIR SHOP and truck loading dock, North Bend Rd., CINCINNATI, O.

(Continued on page 141)

Harbor Freeway near Los Angeles	Looking northerly from above Olympic Blvd., showing completed freeway from Ninth St. in foreground to 4-level in background.
Designer	California Division of Highways, Sacramento, California

Just imagine designing this interchange in a material other than **REINFORCED CONCRETE**

From California to Maine, highway engineers are finding reinforced concrete a logical, economical solution to the complex problems encountered in the design and construction of today's complicated interchanges. For example, just imagine designing the interchange illustrated above in a material other than reinforced concrete.

In addition to this great "plus value" of design flexibility, reinforced concrete has the advantages of being rugged, highly weather-resistant, and lower in first cost as well as requiring less maintenance. Furthermore, all necessary materials and labor are readily available from local sources. Construction starts immediately and proceeds to completion without costly delays. Compare... and you will design for REINFORCED CONCRETE.

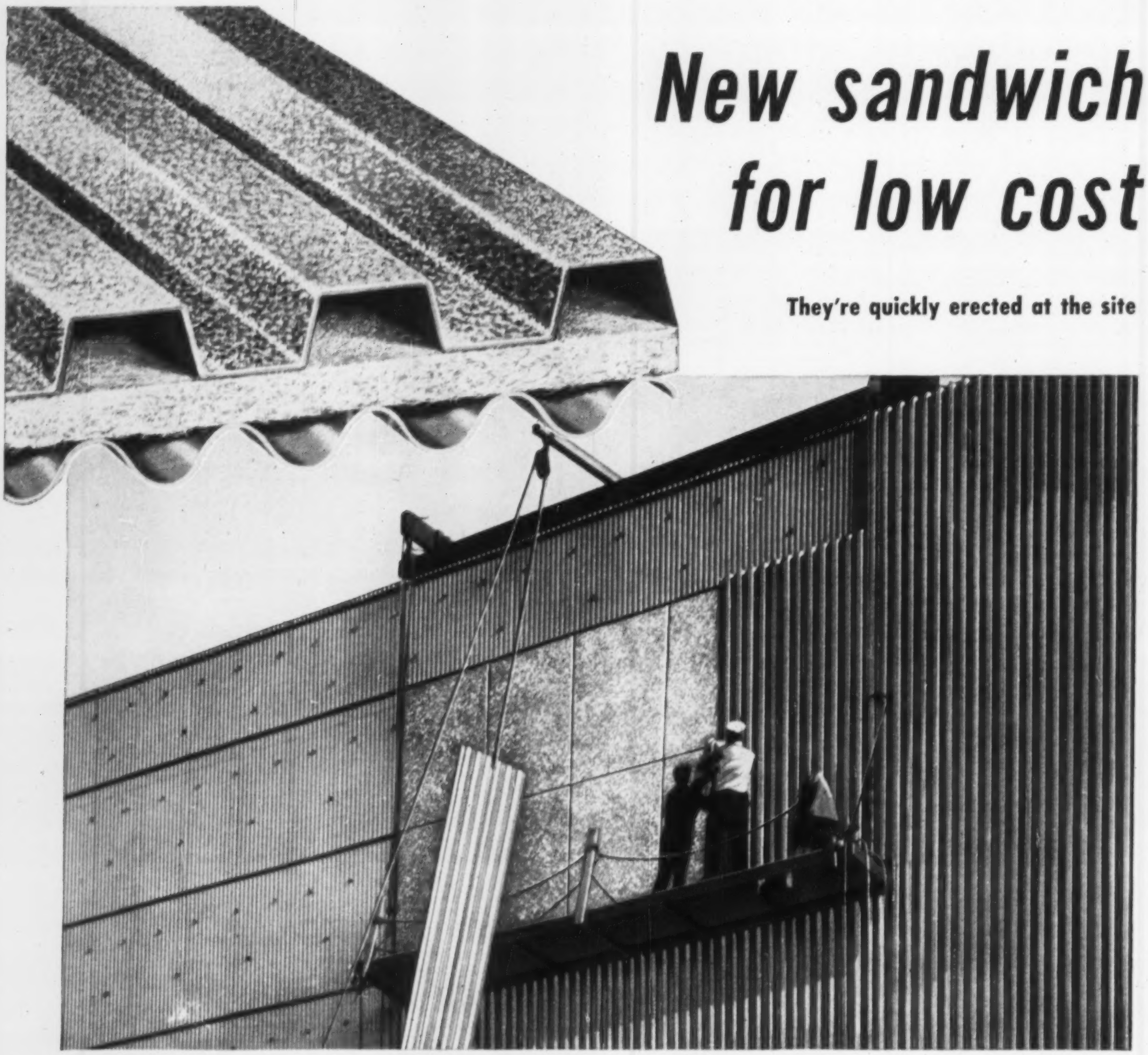
CONCRETE REINFORCING STEEL INSTITUTE C.R.S.I. FOUNDED 1924

CONCRETE REINFORCING STEEL INSTITUTE

38 South Dearborn Street • Chicago 3, Illinois

New sandwich for low cost

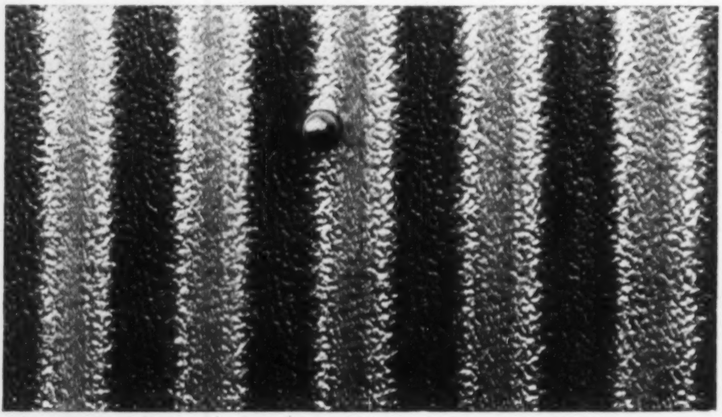
They're quickly erected at the site



WORKMEN INSTALL Kaiser Aluminum ribbed siding on the company's new Ravenswood, West Virginia rolling mill as the final step in constructing the aluminum sandwich wall. To allow early occupancy, a building may be closed initially with only interior sheet. Insulation and exterior sheet can be added later.

QUICK, DEPENDABLE FASTENING SYSTEMS

In large photo above, self-tapping screws are used in combination with Z-bar spacers and stick clips. Welded or new screw type studs with cap nuts (shown at right) may also be used. Specifications available on request.



walls of Kaiser Aluminum insulated wall construction!

with siding sheets from Kaiser Aluminum's complete line of industrial building products

Their cost—*installed*—averages only $1.20 to $1.50 per square foot!

Their high insulation value (U-Factor of less than 0.16 with 1″ thick glass fiber insulation) reduces the load on heating and air-conditioning equipment—with reduced operating expenses for years to come.

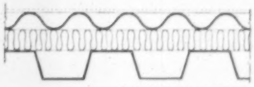
Their "sandwich" design permits easy fabrication in the field—at big savings in construction time and cost.

But that's only *part* of the many advantages you get with attractive new sandwich walls of Kaiser Aluminum.

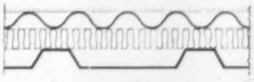
Their extreme light weight, for example, reduces dead load—effecting numerous savings throughout the building structure. Their thin construction (measuring as little as 2¾″ thick) increases usable floor space. Their corrosion resistance—and the fact they never need painting—virtually eliminates maintenance costs.

There's never been a selection of sandwich walls more flexible or more functionally distinctive—at such low cost—than those made with Kaiser Aluminum siding sheets. For counsel, assistance and referral to expert sandwich wall applicators, contact the Kaiser Aluminum sales office listed in your phone directory. Or write Kaiser Aluminum & Chemical Sales, Inc., *General Sales Office*, Palmolive Bldg., Chicago 11, Illinois; *Executive Office*, Kaiser Bldg., Oakland 12, California.

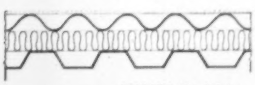
Choose From These and Other Sandwich Combinations



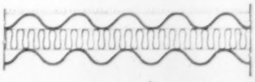
INNER SKIN: 0.024″ Industrial Corrugated Siding
OUTER SKIN: 0.032″ Ribbed Siding — 5.33″ pitch



INNER SKIN: 0.024″ Industrial Corrugated Siding
OUTER SKIN: 0.032″ Ribbed Siding—8″ pitch



INNER SKIN: 0.024″ Industrial Corrugated Siding
OUTER SKIN: 0.032″ Ribbed Siding — 4″ pitch



INNER SKIN: 0.024″ Industrial Corrugated Siding
OUTER SKIN: 0.032″ Industrial Corrugated Siding

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THE BRIGHT STAR OF METALS

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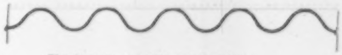
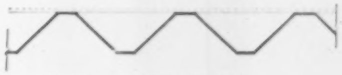
INDUSTRIAL CORRUGATED ROOFING & SIDING



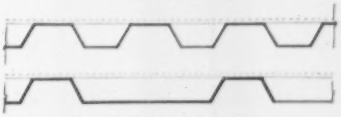
Thickness: 0.024″ and 0.032″
Length: 5′ to 12′ in 6″ increments
Siding Width: 33¾″ and 47⅛″ overall
Roofing Width: 35″ and 48⅛″ overall
Corrugation: ⅞″ deep — 2.67″ pitch
Finish: Plain Mill and Stucco Embossed

V-BEAM ROOFING & SIDING

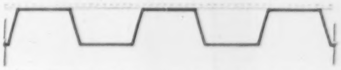


Thickness: 0.040″ and 0.051″
Length: 5′ to 22′ in 6″ increments and 22′-5″
Width: 41¼″ overall
V-Configuration: 1¾″ deep — 4⅞″ pitch
Finish: Stucco Embossed

RIBBED SIDING



Thickness: 0.032″ and 0.040″
Length: 5′ to 22′ in 6″ increments and 22′-5″
Width: 41⅝″ overall
Rib Configuration: 1″ deep—4″ and 8″ pitch
Finish: Stucco Embossed



Also available with rib configuration 1½″ deep—5.33″ pitch. Sheet thickness 0.032″, lengths 5′ to 12′ in 6″ increments. Other specifications on request.

FLAT SHEET ROOFING & SIDING

Thickness: 0.024″ and 0.032″
Finish: Plain Mill and Stucco Embossed

Full specifications on request.

NOTE: Kaiser Aluminum also offers a complete selection of flashing sheet, formed flashing, closures and other accessory items for use in sandwich wall construction.

NEW GARDNER-DENVER "MOLE-DRIL"

(Trade-Mark)

hits the bit where it bites

This drill follows the bit right down through the rock. It cuts deep, big-bore holes . . . reduces drilling time and costs. The Gardner-Denver "Mole-Dril" adds more versatility to any rotary drilling rig.

DELIVERS MORE FOOT-POUNDS OF ENERGY . . .

to the bit than any other drill of its size. No power is lost regardless of drilling depth with this in-the-hole "Mole-Dril". There are no drill rods between drill and bit absorbing hammer shock.

DELIVERS AIR AT FULL PRESSURE FOR CLEANING

Hole cleaning ability is not completely dependent on exhaust air from drill. A separate air stream flows directly through bit at full line pressure to keep cutting face clean. The drill has up-cast exhaust air ports to give cuttings an added boost.

ONLY 3 MOVING PARTS

Rugged, simple construction delivers more work and less trouble. There are only nine major parts in the entire drill.

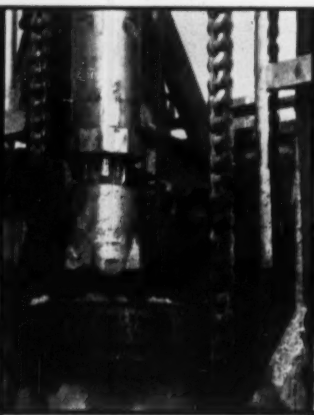
Two sizes available—here are the condensed specifications

	diameter	length	weight	recommended bit size
Model AM6	5¾"	38.6	200 lb.	6½"
Model AM4	4"	35.6	98 lb.	4¾"

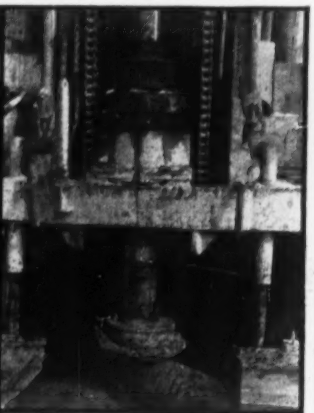
Get the most out of your rotary drilling rig . . . save money . . . drill faster . . . get the new Gardner-Denver "Mole-Dril"

Patent Pending

Drill screws directly to standard drill pipe . . .



Bit screws directly on to drill tappet . . .



and down they go

ENGINEERING FORESIGHT—PROVED ON THE JOB
IN GENERAL INDUSTRY, CONSTRUCTION, PETROLEUM AND MINING

GARDNER - DENVER

Gardner-Denver Company, Quincy, Illinois
In Canada: Gardner-Denver Company (Canada), Ltd., 14 Curity Ave., Toronto 16, Ontario

(Continued from page 136)

Times, Inc., 3253 Spring Grove Ave., Cincinnati, O. E. A. Sobolewski, 2340 Laredo St, Cincinnati, O., engr. Awarded Nov. 15.

Allan & Beischel, 3605 Dawson Ave., Cincinnati, O. CA Approx. **$350,000,** 1 story, air conditioned OFFICE BLDG., 6075 Montgomery Rd., CINCINNATI, O. Standard Bldg. & Loan Co., 6076 Montgomery St., Cincinnati, O. Pepinsky, Graw & Schrand, Union Trade Bldg., Cincinnati, O., archts. Hanly & Young, 123 E. 6th St., Cincinnati, O., engrs. Awarded Nov. 18.

Albert M. Higley Co., 2036 E. 22nd St., Cleveland 15, O., CA Est. **$850,000-$1,000,000** (1 bidder) Italian Renaissance EXHIBITION HALL, CLEVELAND, O. Western Reserve Historical Society, 10825 E. Blvd., Cleveland 6, O. Chas Bacon Rowley & Assocs., Keith Bldg., Cleveland 15, O., archts.

Paugh & Brown Constr. Co., 6007 Euclid Ave., Cleveland 3, O. CA **$380,775,** general contract Indian High Elementary SCHOOL, EUCLID, O. Euclid Bd. Educ., 23131 Lake Shore Blvd., Cleveland 23, O. Bids Nov. 14. CD 10/30.

▲ **F. A. Wilhelm Constr. Co.**, 3914 Prospect St., Indianapolis, Ind. CA **$1,292,897** (Base Bid) 124x 172 ft. brick, Indiana limestone, granite masonry blocks, steel, etc. Eppley AUDITORIUM, ground and first floor, balcony, on Academy campus, CULVER, IND. Culver Educational Foundation, Culver Military Academy, Culver Ind. Bids Nov. 12. CD 11/19.

▲ **McKenzie, Hague & Gilles Co.**, Flour Exchange Bldg., Minneapolis, Minn., CA Est. **$1,500,000.** design and construct slip-form constructing concrete GRAIN ELEVATOR, ALTON, ILL. F. H. Peavey & Co., Paul C. Christensen, ch. engr., c/o Russell-Miller Milling Co., 145 W. Broadway, Alton, Ill. CD 11/20, under CA.

Randolph County Housing Auth., Chester, Ill., rejected bids Oct. 23, 26 unit HOUSING, CHESTER, ILL. LB **$789,000.**

▲ **Chell & Anderson, Inc.**, 5425 N. Kedzie Ave., Chicago, Ill., LB **$2,385,309,** 2 story, brick, stone, Stephan Tyng Mather HIGH SCHOOL, California and Peterson Sts., CHICAGO, ILL. Chicago Bd. Educ., 228 N. LaSalle St., Chicago, Ill. Bids Nov. 18. CD 11/8.

▲ **R. & W. Constr. Co.**, 524 Waukegan, Highwood, Ill. CA **$5,000,000,** adding new PROCESS BLDG., CHICAGO, ILL. Helene Curtis Industries, Inc., 4401 West North Ave., Chicago, Ill. Herman & Salzman, 53 W. Jackson Blvd., Chicago, Ill., archts.

▲ **Sumner Sollitt Co.**, 307 N. Michigan Ave., Chicago, Ill. CA **$1,200,000,** Ruth Cummings Memorial LABORATORY BLDG. addn., 2912-18 S. Ellis Ave., CHICAGO, ILL. Michael Reese Hospital, 29th St. and Ellis Ave., Chicago, Ill. Bids Oct. 8. CD 10/7.

Abbott Constr. Co., 5789 N. Lincoln Ave., Chicago, Ill. CA **$147,800** 1 story, 28,000 sq. ft. brick FACTORY addn., CHICAGO HEIGHTS, ILL. Mohawk Tablet Co., 1703 East End Ave., Chicago Heights, Ill. Bids Oct. 21. CD 10/30, under LB.

▲ **Algot Larson, Inc.**, 3837 W. Lake St., Chicago, Ill., CA **$4,000,000,** 6 story, 250,000 sq. ft. brick addn. to Metal MILLS BLDG., paving, Cicero Ave. and Cermak Rd., CICERO, ILL. Western Electric Co., 26th St. and Cicero Ave., Cicero, Ill. United Engineers & Constr., Inc., 1401 Arch St., Phila., Pa., engr. CD 12/31/56.

J. W. Dobbratz & Assocs., P. O. Box 611, Prospect Heights, Ill. CA **$450,000,** SHOPPING CENTER and parking area, north side of MT. PROSPECT, ILL. Owner, c/o General Contractor, Prospect Heights, Ill.

Wm. R. Goss Co., 8316 S. Ellis Ave., Chicago, Ill. CA **$917,773,** HIGH SCHOOL addn., with swimming pool, 203rd St. and Governor's Hy., PARK FOREST, ILL. School Dist. 227, Sauk Trail, Park Forest, Ill. Nicol & Nicol, 23 E. Jackson Blvd., Chicago, Ill., archts. Bids Oct. 26. CD 10/25.

▲ **Power Constr. Co.**, 125 S. Marion St., Oak Park, Ill. CA **$4,173,429,** HIGH SCHOOL BLDG., ACADEMIC WING and AUDITORIUM, W. side near Weiss Field, WAUKEGAN, ILL. Waukegan Twp. School Dist. 119, 1011 Washington St., Waukegan, Ill. Bids Oct. 15. CD 11/8.

WEST OF MISSISSIPPI

HEAVY CONSTRUCTION—BA

† **Colorado**—BA 12/10—Soil Conservation Service, New Custom House, Denver, protection structures, Kiowa Creek near Elbert, Elbert Co., No. 9-CO-58.

† **Colo., Colorado Springs**—ACADEMY MUSEUM—BA 12/10—Contg. Officer, Air Force Academy Constr. Agency, P.O. Box 1670, constr. Academy Museum (Planetarium) on Air Force Academy site approx. 8 mi. north of here, Inv. No. IFB-05-613-58-25. Plans deposit $20.

† **Colo., Colorado Springs**—FIRE STATIONS, etc.—BA 12/10—Contg. Officer, Air Force Academy Constr. Agency, P.O. Box 1670, 2 structural fire stations, incl. outside utilities, roads, parking areas, sidewalks, topsoiling and seeding on Air Force Academy Site, approx. 8 mi. north of here, Inv. No. IFB-05-613-58-26. Plans deposit $15.

Mo., St. Louis County—BA 12/10—Metropolitan St. Louis Sewer Dist., William O. Kehr, exec. dir., 506 Olive St., St. Louis, Zone 1, 10,300 lin. ft. 8- to 24-in. outfall sanitary sewer and appurtenances in River des Peres Sub. Dist. 1 (Creve Coeur and Frontenac area). Over $100,000. Plans deposit $10. Horner & Shifrin, 1221 Locust St., St. Louis, Zone 3, engrs. CD 3/27.

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SKOOKUM FORGINGS

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No. 54 Swivel Hook
No. 55. Swivel Hook
No. 53 with Headache Ball

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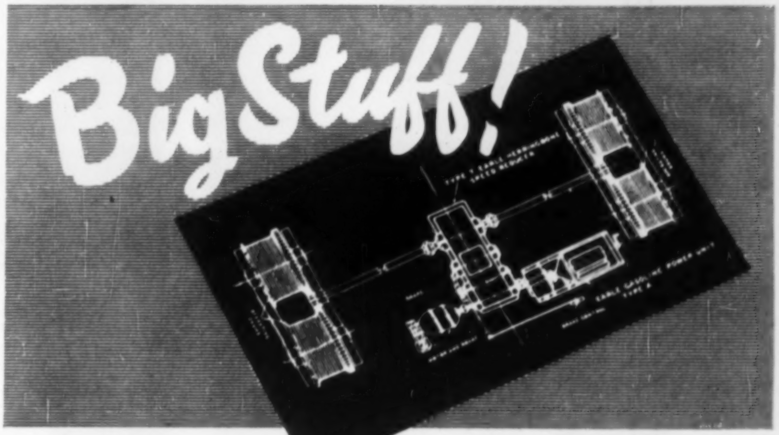

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† **Wyoming**—BA 12/10—Bureau Reclamation, Dpt. Interior, Cody, repair Main canal and Bluff laterals and supplemental work, Hanover-Bluff unit, Missouri River Basin Project, Spec. 601C-52. L. N. McClellan, Bldg. 1A, Denver Federal Center, Denver, Colo., ch. engr.-archt. CD 9/16.

Mo., Kahoka—BA 12/11—City, City Hall, Sect. 1, sewage lift station, involving 2,800 ft. 6 in. CIP force main, lift pumps and 6,170 ft. sewers; Sect. II, 1,200 ft. 6-in. raw water line and 2,700 ft. main extens.; Sect. III, sewage oxidation lagoon. Frank Beard and Donald E. French Assoc. Engrs., Kahoka, Mo., engrs.

† **Missouri**—BA On Or About 12/12—U. S. Eng., 1800 Federal Office Bldg., Kansas City, Zone 6, constr. and repair approx. 11,460 lin. ft. revetment, Lupus to Chamois Reaches, CIVENG-23-028-58-42. CD 6/15/55.

† **Mo., Kansas City**—RADAR EQUIPMENT, etc.—BA 12/12—Civil Aeronautics Admin., Federal Office Bldg., Kansas City, Mo., addnl. space for radar and associated equip. for ARTCC, Municipal Airport, No. 3-58-25. CD 8/12/52.

Neb., Beatrice—BA 12/12—City, City Hall, sewer plant and outfall sewer. $581,040. Extended date. Henningson, Durham & Richardson, 2962 Harney St., Omaha, engrs. CD 11/19.

▲ **Texas**—BA 12/13—Sabine River Auth. of Texas, P.O. Box 195, Greenville, constr. Iron Bridge Dam and Reservoir. Plans deposit $40. Forrest & Cotton, 600 Vaughn Bldg., Dallas, consult. engrs. CD 3/26/56.

▲ **Kan., Wichita**—BA 12/16—City, Robert H. Hess, dir. Water Supply & Sewage Treatment, City Hall, Contract No. 1, sewage treatment plant, $3,000,000, Plans Deposit $35; Contract No. 2, sewage transmission main, **$950,000**. Plans deposit $10. Black & Veatch, 1500 Meadow Lake Parkway, Kansas City, Mo., engrs. CD 10/1.

Tex., Big Lake—BA 12/17—Reagan County Water Supply Dist., Z. I. Ashcraft, Big Lake, imprv. water production (increased lake capacity) $300,000; water lines, $175,000; pumping plant, facilities, $375,000. CD 11/11.

† **Texas**—PARK IMPRVS.—BA 12/19—National Parks, Dpt. Interior, Western Office, Div. Design & Constr., 1000 Geary St., San Francisco 9, Calif. and Region No. 3, National Park Service, Box 1728, Santa Fe, N. M., Big Bend National Park work, consisting of comfort station, sewerage sys., near Alpine, Brewster Co. $75,000.

BUILDINGS—BA

▲ **Tex., Odessa** — SCHOOL — BA 12/12 — Odessa Ind. School Dist., Odessa (Permian) High School. $2,796,580. Plans deposit $65 general, $35 mechanical and electrical. Wilson & Patterson, 601 Bailey St., Fort Worth, archts. CD 5/29.

▲ **Tex., Kountze**—COURT HOUSE ANNEX—BA 12/17—Hardin Co., c/o Court House, Kountze, court house annex. $1,478,601. Dickson, Dickson & Assocs., 2205 Orange St., Beaumont, archts. CD 1/24/56.

▲ **Tex., Bryan**—HOUSING—BA 12/18—City Housing Auth., Bryan, 110 housing units contained in 46 bldgs. $1,000,000. Extended date. Wm. Nash, Box 41, archt. Carter & Burgess, 1100 Macon St., Fort Worth, and J. W. Hall, 601 E. 26th St., Bryan, and Fred Bendon, 400 North Ave., Bryan, engrs. CD 11/21.

HEAVY CONSTRUCTION—LB & CA

Israel Bros. Asphalt, Inc., Ladue and Hunter Rds., P.O. Box 126, Clayton, Zone 26, Mo., LB **$132,930**, est. $198,000 (10 bidders) addnl. parking lot at Lambert-St. Louis Municipal Airport, FAP No. 9-23-034-5812, ST. LOUIS, MO. City, Frank Kriz, acting pres. Bd. P. Service, 304 City Hall, 12 Blvd. and Market St., St. Louis 3, Mo. Bids Nov. 12. CD 10/16.

Brown & Root, Inc., Box 3, Houston, Tex., CA Approx. **$275,000**, BOOSTER STATION and DEHYDRATION UNIT in Luby Fields, near Corpus Christi, Nueces Co.; CA **$200,000**, BOOSTER STATION near Victoria, Nueces Co., TEXAS. Transcontinental Gas Pipeline Corp., 3100 Travis St., Houston, Tex. CD 5/17.

City, City Hall, Kermit, Tex. Owner Builds. **$45,000**, water lines, repairing, replacements, KERMIT, TEX. Freese & Nichols, 407 Danciger Bldg., Fort Worth, Tex., engrs.

City and Kleber Co., Kingsville, Tex. Owner Builds. **$75,000**, park work, KINGSVILLE, TEX. CD 4/12.

City, City Hall, McKinney, Tex. Owner Builds. **$80,000**, street repairing, drainage, surf., McKINNEY, TEX. CD 11/15.

City, City Hall, McKinney, Tex. Owner Builds. **$85,000**, sanitary sewer line repairing, replacements, McKINNEY, TEX. CD 11/15.

† **Neil R. Miller Constr. Co.**, Missoula, Mont. CA **$462,000**. levee and revetment work along 5 mi. of Snake River above Wilson Bridge, WYOMING, U. S. Eng., Walla Walla, Wash. Awarded about Nov. 1.

COLORADO—State Hy. Dpt., 4201 E. Arkansas, Denver, **Herron-Strong**, Box 127, Platteville, Colo. LB **$409,475**. Proj. No. S. 0085 (2), grading structures and plant mixed asphaltic surf. 3.986 mi. Boulder Co. Bids Oct. 25. CD 10/18.

Wade Lahar Constr. Co., 5560 E. 56 Ave., Denver, Colo. CA **$373,630**. installing water pipe line, AURORA, COLO. City, City Hall, Aurora, Colo. Bids Oct. 31, awarded Nov. 18. CD 11/15, under LB.

† **Dpt. of Air Force**, P.O. Box 1670, Colorado Springs, Colo., rejected bids Sept. 26, two fire stations, Air Force Academy, IFB 05-613-58-8, COLORADO SPRINGS, COLO. LB **$280,520**. CD 10/3, under LB.

BUILDINGS—LB & CA

Mastin Constr. Co., Clinton, Mo. CA **$581,745**, est. $580,000. 1 story GRADE and HIGH SCHOOL, incl. gymnasium with stage, locker rooms, classrooms, cafeteria, shops, library, etc., GRANT CITY, MO. School Dist. R-1, Charles H. Shaffner, supt. Schools, Grant City, Mo. Bids Oct. 28. CD 11/4, under LB.

▲ **H. D. Tousley**, 925 E. St. Clair, Indianapolis, Ind., CA **$15,000,000**, 1 story, 1,300,000 sq. ft. ASSEMBLY PLANT, Hy. 66, ST. LOUIS, MO. Chrysler Corp., 344 Mass. Ave., Detroit, Mich. Albert Kahn Associated Architects & Engineers, Inc., 345 New Center Bldg., Detroit, Mich., archt.-engr. CD 10/25.

Bruce Campbell & Co., 2605 Woodson Rd., Overland 14, Mo. Separate Contracts. **$500,000**, 90 or more 1 story, bsmnt., asbestos shingle exteriors, RESIDENCES, concrete fdn., etc., in Audubon Park sub-division on Riderwood Dr., ST. LOUIS COUNTY, MO.

D. C. Bass & Sons, Bass Bldg., Enid, Okla. LB **$843,711**. 3 story, concrete and glass DORMITORY for men; 2 women's DORMITORIES (one 2 story and other 3 story), SPRINGFIELD, MO. Southwest Missouri State College, Walter I. Baker, secy., Springfield, Mo. Bids Nov. 18. CD 10/29;
Sam Davis, 407 Land Bank Bldg., Springfield, Mo. LB **$440,000**. women's DORMITORIES only. (Springfield, Mo.)

Parsons Constr. Co., 2512 Deer Park Blvd., Omaha, Neb. CA **$331,449**, total est. $445,000. general contract SCHOOL addn., OMAHA, NEB. Brownell Hall, 54th and Underwood Ave., Omaha, Neb. Bids Oct. 31. CD 11/8, under LB (**Correction**—low bidder).

Kenneth L. Musgrave Constr. Co., 1402 Glenhaven, Abilene, Tex., CA **$500,000**, MOTEL, ABILENE, TEX. Abilene Motel Investment Corp. (Holiday Inn), c/o A. Bickley, Petroleum Bldg., Abilene, Tex.

W. B. Uhlhorn, Box 2028, Harlingen, Tex., LB **$469,760**, Base Bid. JUNIOR HIGH SCHOOL CAFETERIA, GYM, ADMIN., etc., ALICE, TEX. Alice Ind. School Dist., Alice, Tex. Bids Nov. 14. CD 11/1.

Carpenter Bros., 1335 Plowman St., Dallas, Tex., LB **$337,800**, est. $225,000 Base Bid, BUSINESS STORAGE BLDG., DENTON, TEX. Moore Business Forms, Inc., Denton, Tex. Bids Nov. 13. CD 11/7.

J. C. Yarbrough, 1812 Hunter Rd., El Paso, Tex. Purchase and Hire. **$355,000**. 36 DWELLINGS in Scotsdale Addn., EL PASO, TEX. CD 11/18.

▲ **Paul H. Wolf Constr. Co.**, 2418 W. Alabama St., Houston, Tex. Owner Builds. **$357,000**, 35 DWELLINGS; **$360,000**, 45 DWELLINGS; **$371,150**, 41 DWELLINGS, in "Carvercrest Addn," off Westheimer and Piney Point Rds., HOUSTON, TEX. Grand Total $1,088,150. CD 8/26.

Templeton-Cannon, Box 548, San Angelo, Tex., LB **$460,000**, POWER PLANT UNIT No. 5, Specs. Y-1493 and Y-1494, McCAMEY, TEX. West Texas Utilities Co., 1062 N. 3 St., Abilene, Tex. CD 11/11.

▲ **W. R. Grimshaw Co.**, O'Michael Bldg., Odessa, Tex. CA **$1,567,189**. (Base Bid), HOSPITAL MEDICAL CENTER addn., ODESSA, TEX. Medical Center Hospital, Ector County, c/o Comrs. Court, Odessa, Tex. Bids Oct. 31. CD 11/8, under LB.

Victoria National Bank, Victoria, Tex., cancelled bids to have been opened Dec. 3, 5 story BANK-OFFICE addn., VICTORIA, TEX. **$800,000**. CD 11/19.

† **U. S. Eng.**, 1709 Jackson St., Omaha, Neb., rejected bids Oct. 22. Capehart Family HOUSING at Pueblo Ordnance Plant, Inv. 25-066-58-18, PUEBLO, COLO. LB **$471,978**. CD 11/22, under LB.

FAR WEST

HEAVY CONSTRUCTION—BA

† **Calif., Sacramento**—BA 12/18—U. S. Eng., 1209 8th St., Sacramento, rehabilitation of sewage treatment plant at Mather Air Force Base, Spec. No. 2313, Serial No. ENG. 04-167-57-67. $240,000. CD 7/15, under LB.

▲ **California**—OLYMPIC WINTER GAME FACILITIES—BA 12/19—State Olympic Comn., 465 California St., San Francisco, Phase II—Olympic Winter Game Facilities (1) athletics lounge and dining room bldg. (2) reception center (3) press bldg. $3,000,000. Plans deposit $100. Corlett & Spackman, A.I.A. & Kitchen & Hunt, A.I.A. 347 Clay St., San Francisco, archts. Punnet, Parez & Hutchison, 58 Sutter St., San Francisco, engrs. Bids July 15 rejected. CD 8/14, under LB.

† **Wash., Walla Walla**—ELECTRICAL DISTRIBUTION SYSTEM—BA 2/20—Veterans Admin., Munitions Bldg., Wash., D. C., underground electrical distr. sys., Veterans Administration Hospital: $300,000-$400,000. CD 11/21.

BUILDINGS—BA

Wash., Kent—SCHOOL—BA 12/12—School Dist. 415, 5 unit, 51,000 sq. ft. masonry Junior High School. $400,000. Plans deposit $20. Waldron & Dietz, 215 8 Ave. N., Seattle, archts. CD 3/21.

Calif., Oakland—SHOP BLDGS.—BA 12/17—Oakland Unif. School Dist., 1025 2nd Ave., rein.-con. steel frame shop bldgs. at McClymonds High School. $353,000. Plans deposit $25. Anderson, Hyde & Anderson, Bank of America Bldg., archts. CD 11/12.

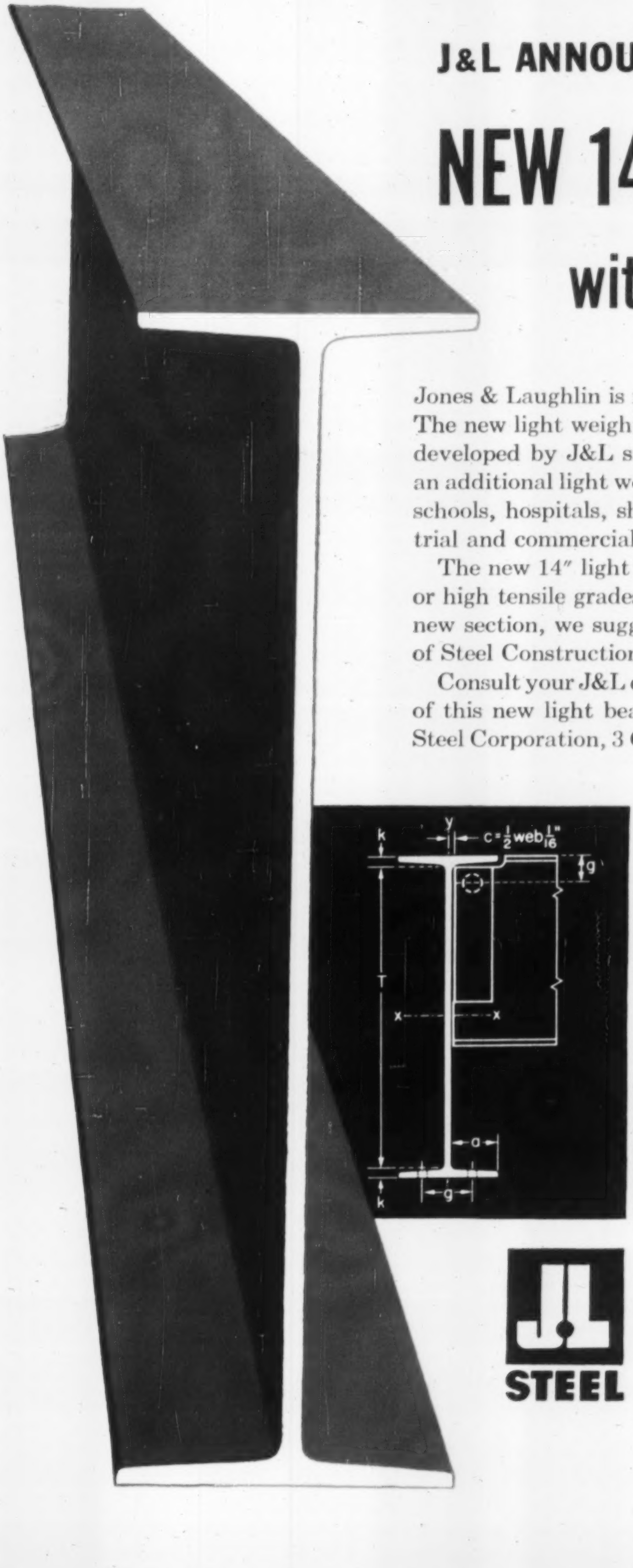
Calif., Porterville—APARTMENTS, etc.—BA 12/17—State Div. Architecture, 1120 N. St., Sacramento.

(Continued on page 144)

J&L ANNOUNCES

NEW 14″ LIGHT BEAM

with 4″ flange



Jones & Laughlin is now producing a 14″, 17.2 lb. light beam. The new light weight hot rolled section, with a 4″ flange, was developed by J&L structural engineers to meet the need for an additional light weight section in the design of apartments, schools, hospitals, shopping centers, parking garages, industrial and commercial buildings.

The new 14″ light beam can be furnished in regular carbon or high tensile grades. For properties and design data on this new section, we suggest you refer to the American Institute of Steel Construction Manual.

Consult your J&L district sales office concerning availability of this new light beam, or write direct to Jones & Laughlin Steel Corporation, 3 Gateway Center, Pittsburgh 30, Pa.

Properties for Designing	
Nominal size	14 x 4 in.
Weight per foot	17.2 lb.
Area	5.05 in.^{2}
Depth	14.0 in.
Flange—Width	4.0 in.
Mean thickness	.272 in.
Web thickness	.210 in.
Axis X-X—I	147.3 in.^{4}
S	21.0 in.^{3}
r	5.40 in.
Axis Y-Y—I	2.65 in.^{4}
S	1.32 in.^{3}
r	.72 in.

Properties for Detailing	
Nominal size	14 x 4 in.
Weight per foot	17.2 lb.
Depth	14 in.
Flange—Width	4 in.
Mean thickness	¼ in.
Web—Thickness	$\frac{3}{16}$ in.
Half thickness	⅛ in.
Distance—a	1⅞ in.
T	12⅞ in.
k	$\frac{9}{16}$ in.
g_1	1¾ in.
c	$\frac{3}{16}$ in.
Max. flange rivet	¾ in.
Usual gage—g	2¼ in.

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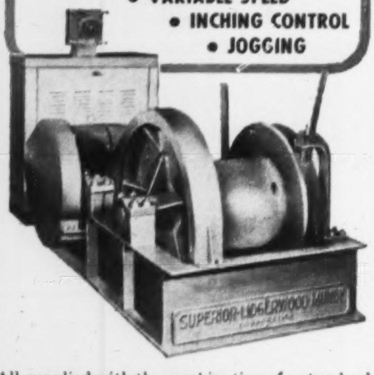

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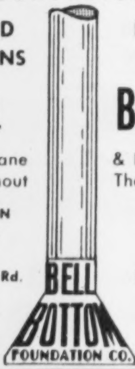

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(Continued from page 142)

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HEAVY CONSTRUCTION—LB & CA

▲ **WASHINGTON**—State Hy. Comn., Olympia, Bids opened 11/19,

Wash.—**F. H. DeAtley Constr. Co.,** Lewiston, Idaho, LB **$79,060** (10 bidders), surf. and constr. bit. surf. treatment on 13.959 mi. Burke West and White Trail roads, FAS Nos. S-1384 (1) and S-1004 (4), Grant Co.;

Wash.—**Fiorito Bros.,** 1100 Leary Way, Seattle, Wash., LB **$596,526** (11 bidders) constr. bit. pavement on frontage roads and cross streets and constr. 3 rein.-con. flat slab bridges on 2.123 mi. Primary State Hy. 1, Connecticut St. to Northwest Ave. in Bellingham, FAP No. I-001-5 (20), Whatcom Co.; LB **$704,161** (6 bidders), surf. c. conc. paving, installing lighting and sprinkler sys. on 2.039 mi. Primary State Hy. 2, Helena St. to Custer St. in Spokane, FAP No. I-002-6 (24) Unit 2, Spokane Co.;

Wash.—**C. Hohner & Son,** R.F.D. 6, Spokane, Wash., LB **$78,957** (10 bidders), constr. bit. surf. treatment on 3.734 mi. Secondary State Hy. 11-A, White Bluffs vicinity, FAS No. S-0271 (3), Adams, Franklin and Grant Counties;

Wash.—**Materne Bros., Inc.,** W 1204 Francis St., Spokane, Wash., LB **$81,990** (7 bidders), draining, grading, surf. 19.661 mi. feeder roads in Block 77, Grant Co.;

Wash.—**McClay Constr. Co., Ltd.,** Vancouver, B. C., LB **$212,471** (8 bidders), 3 rein.-con. flat slab bridges on 0.187 mi. Primary State Hy. 18 at Moses Lake, together with grading, surf. and bit. surf. treatment, FAP No. 1-002-4 (4), Grant Co. CD 11/8.

WASHINGTON—State Hy. Dpt., Olympia, Bids opened 11/19,

J. J. Welcome Constr. Co., Redmond, Wash., LB **$394,079** (19 bidders), clearing, draining, grading, surf. with ballast and constr. rein.-con. flat slab bridge on 4.724 mi. Primary State Hy. 2 Kachess River to Easton; FAP No. I-002-2-(15), Kittitas Co. CD 11/13.

Beall Pipe & Tank Corp., 12005 N. Burgard St., Portland, Ore., CA **$45,453,** 1,500 ft. 48 in. steel pipe for pipe line extension, EVERETT, WASH. City, City Hall, Everett, Wash. CD 8/22.

▲† **E. A. Irish, Contractor,** 2944 Gleneden, Los Angeles, Calif. CA **$5,263,542** Schedules 1 thru 9; structures and concrete or steel pipe lines and access roads for Casitas Gravity Main Oakview and other mains, Ventura River Proj., DC 4956, near Ventura, CALIFORNIA. Bureau Reclamation, Dpt. Interior, Oak View, Calif. Bids Sept. 24. CD 9/30, under LB.

▲ **Diversified Builders & Macco Corp.,** P.O. Box 390, Montebello, Calif. CA **$3,374,000** (joint venture) (a) Phase I, Olympic Games Facilities at Squaw Valley, Placer Co., incl. sanitary and water sys., lake control ski and bob sled runs, 2 bridges, park areas, arena foundation, 4 athletic houses, 2 spectator centers, administration bldg., etc., CALIFORNIA. State Olympic Comm., 465 Calif. St., San Francisco, Calif. Corlett & Spackman, Kitchen and Hunt, A.I.A., 347 Clay St., San Francisco, Calif., archts. Bids June 3, awarded Oct. 28. CD 6/19, under LB.

▲ **CALIFORNIA**—State Div. Hys., 120 S. Spring St., Los Angeles,

Ukropina-Polich-Kral, 201 E. Las Tunas Dr., San Gabriel, Calif., CA **$4,878,927,** 1.6 mi. Golden State Freeway in Glendale and Burbank between 0.3 mi. south of Alameda Ave. and Burbank Blvd., incl. 6 major structures, Vii-La 4, Los Angeles Co., Bids opened Oct. 24, awarded Nov. 19. CD 10/29, under LB.

† **Basich Constr. Co. & N. L. Basich,** P. O. Box 37, South San Gabriel, Calif., LB **$161,347** (3 bidders) joint venture repair asph. roads Increment No. 1, Naval Air Station, Spec. 14848-57, EL CENTRO, CALIF. Eleventh Naval Dist., 1220 Pacific Hy., San Diego, Calif. Bids Nov. 14. CD 11/1.

Slater Electric Co., 608 Sutter St., Folsom, Calif., LB **$96,914** (8 bidders) high intensity lighting sys. on Fulton Ave., SACRAMENTO, CALIF. Bd. Supervs. Sacramento Co., Courthouse, Sacramento, Calif. Joseph Spink, 408 California Fruit Bldg., Sacramento, Calif., engr.

M&K Corp., 519 Califorinia St., San Francisco, Calif., LB **$101,101** (8 bidders) site and foundation work for State Compensation Insurance Fund Office Bldg. W.O. 4020SC, SAN FRANCISCO, CALIF. State Div. Architecture, 1120 N. St., Sacramento, Calif. Bids Nov. 19. CD 11/6.

Chas. J. Dofman, 124 N. La Brea Ave., Los Angeles, Calif., CA **$102,394** Hillcrest Interceptor Sewer, SANTA BARBARA, CALIF. City, City Hall, Santa Barbara, Calif. Bids Nov. 7, awarded Nov. 14. CD 10/2, under LB.

M&K Corp., 519 California St., San Francisco, Calif., LB **$711,500** (7 bidders) 3,776 seating capacity grandstand, incl. water sewers and electrical services, etc. E.O. 4174SC, 3612, SC 3501 SC, 3976 SC, STOCKTON, CALIF. State Div. Architecture, 1120 N St., Sacramento, Calif. Bids Nov. 19. CD 10/29.

BUILDINGS—LB & CA

F. P. Lathrop, 800 University Ave., Berkeley, Calif. LB **$443,000 (1) $628,000 (2) $688,000 (3) $780,000 (4)** (8 bidders) Type I constr. 20,000 sq. ft., Type I constr. HOSPITAL addn. and remodel, BERKELEY, CALIF. Alta Bates Community Hospital, c/o Hospital Administrator, 3000 Regent St., Berkeley, Calif. Bids Nov. 14. CD 11/8.

Harbor Constr. Co., 2116 S. Main St., Santa Ana, Calif. CA **$745,600,** sixty-four 1,380 sq. ft. stucco DWELLINGS Track No. 3187, COSTA MESA, CALIF. College Park Track No. 4, 2116 S. Main St., Santa Ana, Calif.

▲ **Fluor Corp.,** 589 5th Ave., New York, N. Y. CA **$2,000,000,** design and construct 275,000 lb. per hr. STEAM GENERATING PLANT and other facilities, at refinery, EL SEGUNDO, CALIF. Standard Oil Co. of California, 225 Bush St., San Francisco, Calif. Constr. Aug. 1958. CD 8/18/52.

† **U. S. Eng.,** 180 New Montgomery, San Francisco, Calif., cancelled bids to have been opened about Nov. 11, BRANCH POST EXCHANGE BLDG., ENG-04-203-58-300. FORT ORD, CALIF. CD 11/15.

Equitable Service Co., 1308 Shatto St., Los Angeles, Calif., CA **$600,000,** ten 7,483 sq. ft. APARTMENT HOUSES, 5001-23 Hayter St., LAKEWOOD, CALIF. Ben Weingart, 1308 Shatto St., Los Angeles, Calif.

James I. Barnes Constr. Co., 1119 Montana Ave., Santa Monica, Calif. LB **$655,400** (10 bidders) general constr. 74,000 sq. ft. floor area LIBRARY addn. at Long Beach State College, W.O. 3719GC 56, LONG BEACH, CALIF. State Div. Architecture, 1100 S. Grand Ave., Los Angeles, Calif. Bids Nov. 20. CD 10/24.

▲ **Bethlehem Pacific Coast Steel Corp.,** P.O. Box 2057, Terminal Annex, Los Angeles, Calif., LB **$1,194,777** (6 bidders) 9 story structural steel penthouse and basement State OFFICE BLDG., LOS ANGELES, CALIF. State Div. Architecture, 1100 S. Grand Ave., Los Angeles, Calif. Bids Nov. 20. CD 10/28.

J. H. MacDonald, 321 S. San Vicente, Los Angeles, Calif., CA **$450,000,** 149,650 sq. ft. WAREHOUSE, 5505 Olympic Blvd., LOS ANGELES, CALIF. New York Merchandise Co., 321 S. San Vicente Blvd., Los Angeles, Calif.

Hunny Investment Co., 9026 E. Las Tunas, Temple City, Calif. Owner Builds. **$532,900,** 48 stucco DWELLINGS, E. Grove St., E. Valerio Ave., Verdugo Ave., POMONA, CALIF.

▲ **Haas & Haynie,** 275 Pine St., San Francisco, Calif. CA Approx. **$1,000,000,** one 1 story and one 2 story, 16,000 sq. ft. PLANT, RIPON, CALIF. Nestles Co., Inc., c/o John A. Blume & Assocs., engrs., 612 Howard St., San Francisco, Calif. CD 3/3/47.

Burgener Constr. Co., Box 569, La Jolla, Calif., CA **$361,900,** 25 DWELLINGS, Vista Bahia Track No. 1, SAN DIEGO, CALIF. Norman Development Co., Box 569, La Jolla, Calif.

▲ **Nylin Hurd Constr. Co.,** 1317 Santiago Ave., Santa Ana, Calif. CA **$1,656,800,** FINANCE BLDG. in Civic Center, SANTA ANA, CALIF. Bd. Supervs. Orange Co. Court House, Santa Ana, Calif. Bids Nov. 19. CD 11/8.

Bill A. Smith & Co., 5818 Venice Blvd., Los Angeles, Calif., LB **$411,900** (14 bidders) AUDITORIUM rehabilitation, Longden School and Temple City HIGH SCHOOL addn. No. 1, TEMPLE CITY, CALIF. Temple City School Dist., 9516 E. Longden Ave., Temple City, Calif. Smith, Powell & Morgridge, 708 W. 8th St., Los Angeles, Calif., archts. Bids Nov. 15. CD 6/25/54.

Kenneth C. Urton, 775 Couque St., Santa Barbara, Calif., LB **$435,850** (8 bidders) 41,000 sq. ft. Poinsettia SCHOOL, VENTURA, CALIF. Ventura School Dist., 1120 E. Main St., Ventura, Calif. Bids Nov. 13. CD 10/28.

CANADA

BUILDINGS—BA

Alta., Cardston—HOSPITAL—BA 12/18—The Hospital Bd., The Cardston Municipal Hospital, Cardston, 40-bed hospital, Approx. $350,000.

HEAVY CONSTRUCTION—LB & CA

▲ **Nelen Ltd. & Assocs.,** Box 354, Fort William, Ont. CA **$4,069,972.** Spread V, constr. 367 mi. section of Trans-Canada pipe line between Fort Arthur and Kapuskasing, Ont., ONTARIO AND MANITOBA. Northern Ontario Pipe Line Crown Corp., c/o Defense Constr. (1951) Ltd., 56 Lyon St., Ottawa, Ont. Grand total $20,827,788. Bids Oct. 11. CD 10/22, under LB;

Morrison Chivers Co., Ltd., 42 Industrial St., Leaside, Toronto. CA **$4,070,590.** Spread W (Ontario and Manitoba);

Majestic Contractors, Ltd., 405 Royal Trust Bldg., Edmonton, Alta. CA **$3,815,308.** Spread X (Ontario and Manitoba);

River Constr. Corp., Vancouver, B. C. CA **$4,807,903.** Spread Y (Ontario and Toronto);

Mannix Ltd., 332-7th Ave. S.W., Calgary Alta. CA **$4,064,015.** Spread Z (Ontario and Manitoba).

Huron Constr. Co. Ltd., 125 Keil Dr., Chatham, Ont. LB **$369,145.** (20 bidders), constr. and recapping existing aprons and taxiways and constr. new Runway 10-28, at Malton Airport, TORONTO, ONT. Dpt. Transport, Hunter Bldg., Ottawa, Ont. Bids Nov. 18. CD 11/6.

QUEBEC—Provincial Roads Dpt., Quebec City,

Dubois Constr. Co., 504 Commercial St., La Tuque, Que. CA **$150,000.** viaduct under Canadian National Ry. tracks at Garneau Junction. Awarded Nov. 13. CD 3/27.

City, City Hall, Montreal, Que., cancelled bids to have been opened Oct. 9, constr. Angrignon Park Pumping Station, west end of Cote St. Paul Rd., MONTREAL, QUE. Over **$50,000.** Plans deposit $100. Project cancelled. CD 9/27.

BUILDINGS—LB & CA

T. A. Wilson Constr. Co. Ltd., 26 St. John St., Cannington, Ont. CA **$100,000.** INDUSTRIAL BLDG.,

(Continued on page 148)

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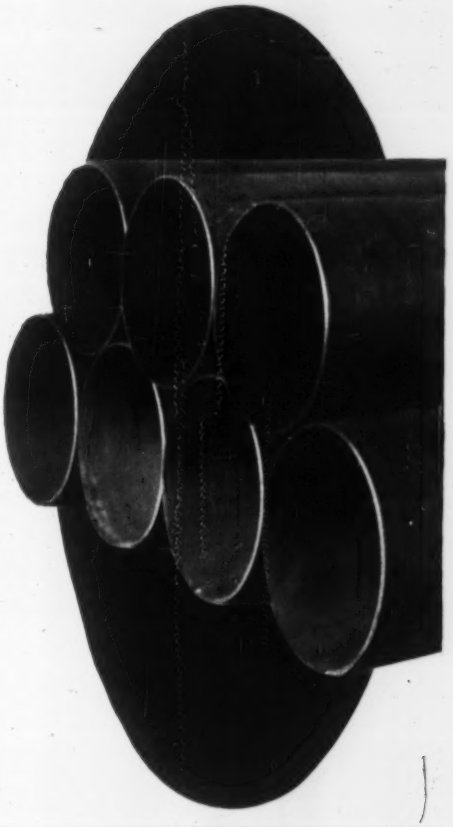

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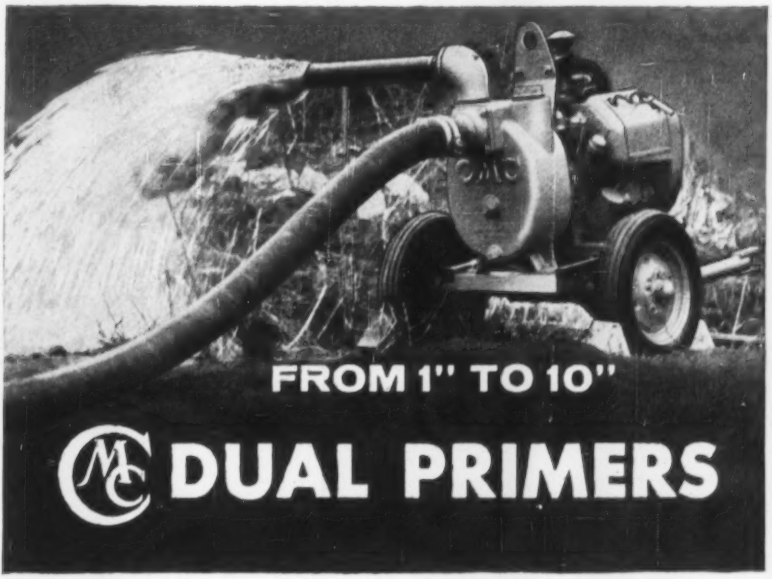

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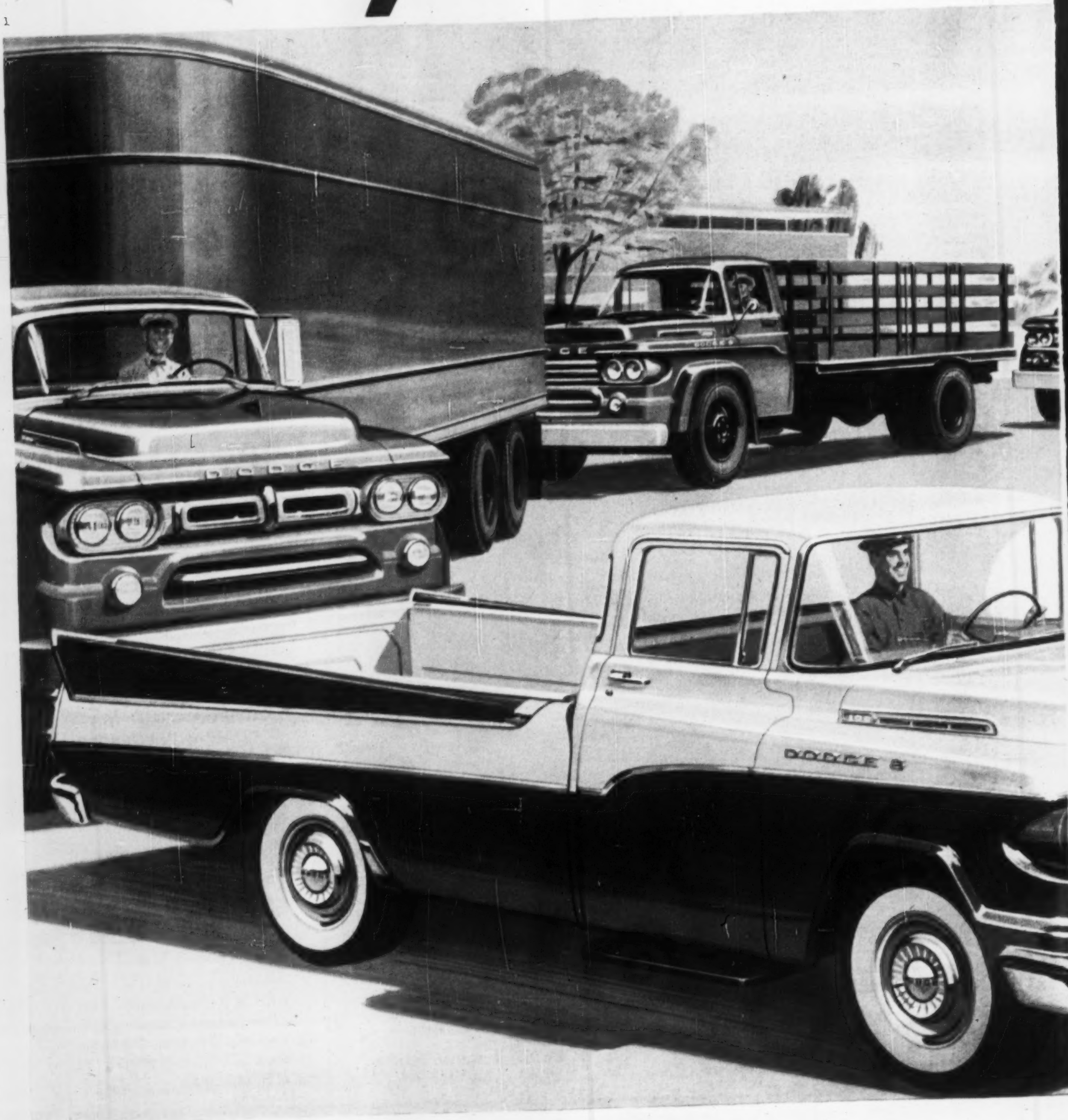
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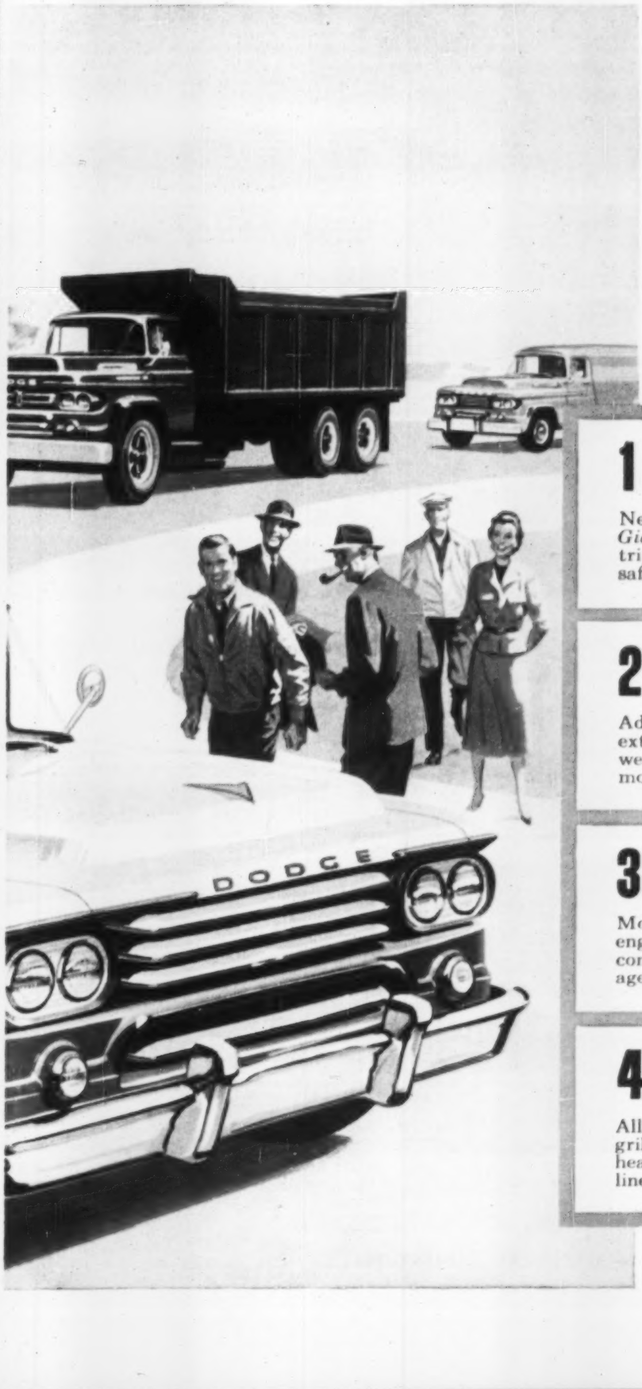

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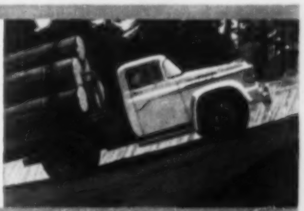

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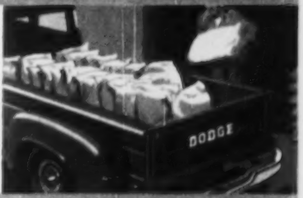

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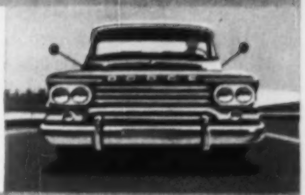

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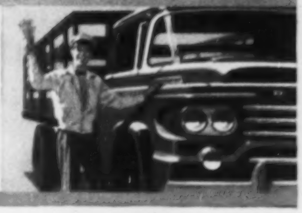

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(Continued from page 144)

LINDSAY, ONT. Lindsay Investments Ltd., c/o contractor. Awarded Nov. 12.

Smith Bros. & Wilson Ltd., 524 2nd Ave. N., Saskatoon, Sask. CA **$424,700** (7 bidders) 2 story rein.-con. OFFICE, 5th Ave. and 22nd St., SASKATOON, SASK. Saskatchewan Power Corp., 1744 Cornwall St., Regina, Sask. Bids Sept. 17, awarded Nov. 1. CD 9/12.

ALASKA

HEAVY CONSTRUCTION—BA

† **Alaska**—LABORATORY—BA 1/7—U. S. Eng., Anchorage, National Bureau of Standards laboratory, Elmendorf Air Force Base, Inv. 58-8. CD 8/22/55.

U. S. POSSESSIONS

BUILDINGS—BA

† **Canal Zone, Fort Gulick**—Chapel, etc.—BA On Or About 12/24—U. S. Eng., P. O. Box 4970, Jacksonville 1, Fla., chapel and religious educational wing, FY 58, Serial No. ENG-08-123-58-15.

AMERICANS ABROAD

HEAVY CONSTRUCTION—LB & CA

† **Entrecanales y Tavora**, Madrid, Spain, LB **$487,000**. W-7 technical site, Spanish Air Base Program, Spanish contractors, SOL-5, Soller Island of Mallorca, SPAIN. Bureau Yards & Docks, Dpt. Navy, 18 and Constitution Ave. N.W., Wash., D. C., U. S. A. Bids Oct. 30.

BUILDINGS—LB & CA

United Construction & Ind. Co., Seoul, Korea, CA **$750,000**. STAFF HOUSING, SEOUL, KOREA. Dpt. of State, Foreign Bldgs., Wash., D. C., U. S. A. Bids May 6, awarded Nov. 20. CD 4/22.

PROPOSED PROJECTS

WATER SUPPLY

Calif., Downey—Downey County Water Dist., Downey, 5 m.g. reservoir, prestressed concrete on caissons partially below ground level, **$250,000**. Kenneth Bruner, 8339 E. 2 St., consult. engr.

▲ **Calif., Mountain View**—City, City Hall, bond election Jan. 14, water distr. sys. expansion. **$2,500,000**. CD 1/28.

▲ **Colo., Denver**—Bd. Water Comrs., City and County Bldg., **$75,000,000** bond election in Summer of 1958, water system (expansion), incl. constr. Dillon Reservoir; addnl. filter plant facilities, etc., Dillon and Kassler. CD 8/11/55.

Conn., Bethel—Village, Water Dpt., Town Hall, water system imprvs. **$100,000**.

▲ **Fla., Hialeah**—City, City Hall, defeated bonds, Nov. 12, water system expansion. **$3,000,000**. CD 10/30.

Idaho, Emmett—City, City Hall, expand water sys. **$100,000**. G. W. Knowles, Emmett, consult. engr. CD 10/31.

Ill., Park Forest—Village, Village Hall, water plant addn. **$510,000**. Greeley & Hansen, 220 S. State St., Chicago, consult. engrs.

▲ **La., Napoleonville**—Assumption Parish, c/o C. F. Daigle, Napoleonville, plans by J. B. McCrary Co., 22 Marietta St. N.W., Atlanta, Ga., water treatment plant, **$2,250,000**; 2 water booster stations, tanks and filter beds, **$1,250,000**. Charles Smith, Box 72, Thibodeaux, resident engr.

Mich., Troy—City, J. Lawson Lockhart, clk., 60 W. Wattles Rd., water mains in Wattles, Dequindre, Grover, Webb, Marengo area, extension of Livernois line and imprv. Coolidge and Shephenson mains. **$190,000**. CD 6/18/56.

Minn., Fairmont—City, Bd. Utilities, c/o Secy., plans by W. W. Kane, Austin, 1 and 2 story, 40 x 100 ft. water treatment plant addn. **$100,000**. Bids in 1958.

Wash., Seattle—City, County-City Bldg., Seattle, Zone 4, 35,000 ft. 8 in. water distr. mains in 42 Ave. N. E. between E. 95 and 125 Sts. **$381,530**, R. W. Morse, city engr. Work to begin in spring.

W. Va., Wellsburg—City, City Hall, rehabilitation of filter plant, **$140,000**; modernizing distribution sys. **$320,000**. Pride Eng. Assocs., Glenshaw, Pa., consult. engrs.

Ont., London—London P. Utilities Comn., V. A. McKillop, mgr., 24 in. water main to run from Spring-Bank Park to Huron and Adelaide Sts. **$688,000**. James F. MacLaren Assocs., 321 Bloor St. E., Toronto, consult. engrs.

SEWERS, WASTE DISPOSAL

Calif., Indio—Indio Sanitary Dist., Indio, sewer trunk extensions. **$375,000**. Koebig & Koebig, 3242 W. 8 St., Los Angeles, consult. engrs.

▲ **Calif., Mountain View**—City, City Hall, bond election Jan. 14, sewage disposal facilities, **$200,000**; sanitary sewers, **$2,000,000**; storm drainage, **$1,000,000**. CD 1/28, under Water Supply.

▲ **Fla., Hialeah**—City, City Hall, defeated bonds, Nov. 12, sanitary sewerage system, **$14,000,000**; incinerator, **$750,000**. CD 10/30.

▲ **Idaho, Pocatello**—City, City Hall, bond election Feb. 18, new sewage treatment plant, **$1,250,000**. CD 10/31/56.

(Continued on page 150)

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(Continued from page 148)

Ind., Paoli—Village, Village Hall, sewerage sys., **$955,000**, Federal grant approved for $135,242 to aid.

Iowa, Sioux Center—City, City Hall, sewage plant, **$240,000**.

Ky., Radcliffe—City, City Hall, sewerage sys. **$500,000.** Snyder McClellan & Assoc., Hillsboro, Ind., consult. engrs.

Mich., Mt. Pleasant—City, Allen J. Kronbach, clk., Mt. Pleasant, sewage treatment plant and interceptor sewers **$400,000.** Consoer Townsend & Assoc., 360 East Grand Ave., Chicago 11, Ill., engrs.

Mich., Traverse City—City, F. A. McCall, clk., sewage plant addns. **$650,000.** C. L. Andrews, city engr.

Minn., Grand Rapids—City, Alan Fowler, mayor, sewage disposal plant. **$200,000.** CD 4/12/46.

Minn., Mazeppa—Village, W. F. Tri, clk., Mazeppa, voted $143,000 bonds Nov. 5, sewage disposal plant, **$145,000.** L. E. Nelson, 7509 First Ave. South, Minneapolis, engr. Constr. probably 1958.

Minn., St. Peter—City, C. E. Dahlgren, city engr., and Minn. State Dpt. Admin., 120 State Capitol, St. Paul, sewage-disposal plant to serve both city and St. Peter State Hospital, **$850,000.** Toltz, King, Duval, Anderson & Assocs., 1509 Pioneer Bldg., St. Paul, engrs. Constr. probably 1958. CD 4/12/56.

O., Arcanum—Village, Village Hall, defeated **$140,000** bonds Nov. 5, sewerage system. CD 6/7.

O., Bedford—City, City Hall, 30 S. Park St., storm and sanitary sewers, **$250,000**. Verne Clark Eng. Co., 4050 Brookpark Rd., Cleveland, Zone 29, and Frank B. Krause, Jr., 17021 Broadway, Bedford, consult. engrs. CD 11/11.

O., Centerville—Village, sewage treatment plant. **$550,000-$750,000**. Ralph Woolpert, 360 W. 1st. St., Dayton, consult. engr. Leo Wall, city engr.

▲ **O., Euclid**—City of Euclid, City Hall, 585 E. 222 St., Cleveland, Zone 23, voted 2-mill levy Nov. 5, sewers imprvs. in city. **$2,000,000.** CD 9/12.

O., Flushing—Village, E. W. Starkey, mayor, sewage disposal plant, **$300,000.** Constr. Spring 1958.

O., LeRoy—Village, Village Hall, voted **$200,000** bonds Nov. 5, imprv. sewerage system. CD 8/16.

O., South Euclid—City, City Hall, water retention basin off Langerdale Rd. and sewer imprvs. in Mackall-Green Rd. area. **$350,000.** H. P. Peterson, 2300 Warrensville Center Rd., Cleveland, Zone 18, consult. engr. CD 11/12.

O., Sylvania—Village, intercepting sewer to serve area east of Harroun Rd. **$200,000.** Harold Stepleton, 4528 Monroe St., Toledo, engr. CD 9/30/52.

Pa., Lebanon—City, City Hall, sewage treatment facilities, incl. imprv. or modernizing existing treatment plant or constr. entire new plant for complete treatment of sewage. **$2,300,000**. Gannett Fleming, Corddry & Carpenter, Inc., 600 N. 2 St., Harrisburg, consult. engr. CD 11/11.

▲ **Vt., St. Johnsbury**—Town, Town Hall, sewerage facilities, **$1,800,000**. Paul F. Howard, Whitman & Howard, 89 Broad St., Boston 10, Mass., engrs. CD 11/11.

▲ **Va., Pulaski**—Town, Town Hall, sanitary sewerage sys., incl. collection lines, interceptor and sewage treatment plant, Proj. N. Va. 44-P-3017. **$1,000,000**, Wiley & Wilson, Courtland Bldg., Lynchburg, consult. engrs. CD 11/11.

Wash., Wishram—Wishram Sewer Dist., sewage collection sys. **$80,607**; treatment plant **$73,800**, Cornell, Howard, Hayes & Merryfield, Corvallis, Ore., consult. engrs.

BRIDGES

▲ **Calif., Los Angeles**—Los Angeles Co. Hall of Records, bridge over Rio Hondo on Lower Azusa Rd., Azusa, **$155,700;** bridge over Dominguez Channel on Carson St., Dominguez, **$124,000;** bridge over Big Dalton Creek on Irwindale Ave., Irwindale, **$78,000;** bridge over North Fork of Coyote Creek on Rosecranz Ave., Lakewood, **$82,000;** bridge over Coyote Creek on Rosecranz Ave., Lakewood, **$244,000;** bridge over South fork of Bill Creek on Platt Rd, Los Angeles, **$77,000;** bridge over south fork of Bell Creek on Victory Blvd., Los Angeles, **$112,000;** bridge over south fork of Bell Creek on Van Owen St., Los Angeles, **$87,000;** bridge over San Dimas Wash, on Arrow Hy, San Dimas, **$78,000;** Wilmington Ave. bridge over Dominguez Channel, Wilmington, **$354,000**. S. R. Kennedy, c/o owner, engr.

O., Toledo—City, Russell W. Rink, mgr., City Hall, pedestrian-vehicular bridge, 2 lane and two 5 ft. sidewalks over North Toledo Expressway on Clay St. to serve Hyde Park area, on line with Clay St. **$260,000**. John Davis, city engr. CD 2/15/56.

▲ **Wash., Bellingham**—Whatcom Co., Co. Courthouse, bridge from mainland at Gooseberry Point south of Ferndale to Lummi Island. **$1,600,000**. J. T. Lay, co. engr.

QUEBEC—Dpt. P. Wks., Parliament Bldgs., Quebec City,

Saguenay Co.—constr. bridge, Ste. Anne de Portneuf **$500,000**. Olivier Desjardins, ch. bridge engr.

Que., Riviere du Loup—Canadian National Railways, A. V. Johnston, ch. engr., 355 McGill St., Montreal; and Municipality of Riviere du Loup, viaduct under Canadian National Railway, Route No. 51, **$250,000**.

STREETS AND ROADS

Calif., Los Angeles—Los Angeles Co., Hall of Records, Los Angeles, imprv. Avalon Blvd. from Rosecranz

(Continued on page 152)

Where America Greets the World...

New York International Airport, International Arrival Building, Idlewild, New York.

Constructed for: The Port of New York Authority.
Architects: Skidmore, Owings & Merrill.
General Contractor: Cauldwell-Wingate Company.
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Zonolite vermiculite Plaster Aggregate and Zonolite Acoustical Plastic used throughout the International Arrival Bldg. and its two adjacent Foreign Flag Airline Buildings.

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But back of this beauty is the story of a combination of plastering problems met and solved. These problems included acoustics...fire protection...the 3-inch expansion of this 204-ft. by 108-ft. arch...and securing the kind of light reflection which would help harmonize indoor artificial lighting with natural light coming in through the big glass front of the building.

Zonolite vermiculite Plaster Aggregate and Zonolite vermiculite Acoustical Plastic met fire safety and acoustical requirements. In addition, they contributed light reflection which was neither specular nor fuzzy. Expansion was handled by dimensionally stable Zonolite in 15- by 24-ft. panels with unobtrusive expansion beading between.

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Modern design presents problems of light weight, firesafe construction, and Zonolite provides opportunity to make the most of modern design. Lightweight Zonolite vermiculite products take the "load" off buildings, save tons of dead weight...are unsurpassed for fireproofing...offer high insulation and acoustical values. Above all, they cut costs. While planning your next project why not mail the coupon for complete data on modern Zonolite for today's building needs?

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This 204- by 108-ft. clear span parabola was fireproofed with Zonolite vermiculite Plaster Aggregate and sound conditioned with Zonolite vermiculite Acoustical Plastic. Zonolite provided the desired light reflection and expansion was handled by dimensionally stable Zonolite in large areas with expansion bead between.

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(Continued from page 150)

Ave. to Compton Blvd., Compton, **$150,000**; imprv. Arrow Hy. from Citrus Ave. to LaVerne city boundary, La Verne, **$80,000**; imprv. Arrow Hy. west city boundary to Park Ave., La Verne, **$97,950**; imprv. Aviation Blvd. from Rosecranz to Redondo Beach Blvds., Manhattan Beach, **$157,500**, imprv. Crenshaw Blvd from Palos Verdes Dr. north to Palos Verdes Dr. south, Palos Verdes, **$205,379**; imprv. Del Amo Blvd., Long Beach Freeway to Wilmington Blvd., Wilmington, **$164,200**; imprv. Downey Rd. from Leonis Blvd. to Slauson Ave., Vernon, **$216,750**. S. R. Kennedy, c/o owner, engr.

▲ **Calif., Mountain View**—City, City Hall, bond election Jan. 14, bridges, street imprvs. **$2,725,000**. CD 7/10.

Mich., Southfield—Southfield Twp., Eugene Swem, superv., Southfield, street paving. **$233,000**.

▲ **Mo., St. Louis**—City, Frank Kriz, acting pres. Bd. P. Service, 304 City Hall, 12th Blvd. and Market Sts., Zone 3, Section of Forest Park Parkway from Euclid and Forest Park Aves. thru Forest Park to point just West of Union Blvd. with necessary bridges in Forest Park, etc., **$2,550,000**. F. Ray Martin Engineers, Inc., 407 N. 8th St., Zone 1, engr. CD 6/7/55.

OHIO—State Hy. Dpt., Columbus, Zone 15,
Lucas Co.—relocating U. S. 23 Expressway from Monroe St. in Sylvania, O. to Ohio-Michigan Line, with interchange at Sylvania, with two 24-ft. wide pavements, and 70 ft. wide grass medial strip, Sylvania. **$1,100,000**. Bids in Spring 1958. Sanzenbacher, Miller & Brigham, 3023 Sylvania Ave., Toledo, consult. engrs.

O., Bedford—City, City Hall, street paving program, **$150,000**. Verne Clarke Eng. Co., 4050 Brookpark Rd., Cleveland, Zone 29, consult. engr. Frank B. Krause Jr., 17021 Broadway, engr. CD 11/11.

EARTHWORK, WATERWAYS

▲ **Conn., West Haven**—SHELL Oil Corp., 100 River St., New Haven, dredging New Haven Harbor for access to and fill for bulk oil storage depot, Sandy Point, **$1,000,000**. site preparation for bulk oil storage depot, Sandy Point, **$1,500,000**.

† **West Virginia**—U. S. Eng., 237 4 Ave., Huntington, Zone 18. engineering services, road relocations, Sutton Reservoir Proj., Elk River. Hayes, Seay, Mattern & Mattern, 1615 Franklin Rd. S. W., Roanoke 16, Va., consult. engrs.-archts. CD 9/5.

AIRPORTS

▲ **Calif., El Centro**—RUNWAY, etc.—11th Naval Dist., San Diego, runway extension at Naval Auxiliary Air Station (includes land), **$4,135,000**; operational facilities and land acquisition, Naval Auxiliary Air Station **$4,310,000**.

▲ **Calif., Oakland**—TERMINAL FACILITIES—Port of Oakland, foot of Grove St., terminal facilities at Metropolitan International Airport. **$6,000,000**. CD 5/1/53.

▲ **Calif., San Francisco**—MAINTENANCE CENTER—United Air Lines, 400 Port St., 1 story, 120,000 sq. ft. jet maintenance center at International Airport. **$4,000,000**. Albert Kahn Assoc. Archts. & Engrs., Inc., 345 New Center Bldg., Detroit, Mich., consult. engr. Bids about Feb. 1. CD 8/22/55.

Iowa, Marshalltown—AIRPORT—City, City Hall, **$250,000**. bond election Dec. 10, airport constr.

▲ **Neb., Reno**—AIRPORT TERMINAL—City, City Hall, plans by Vhay & Grow, 131 W. 2 St., airport terminal bldg. **$1,000,000**. Project expected to be completed in 1½-2 years. CD 3/4.

▲ **Okla., Oklahoma City**—AIRPORT IMPRVS.—City, City Hall, bond election Dec. 17, airport expansion. **$7,500,000**.

LATIN AMERICA

▲ **Mexico**—Sria de Comunicaciones y Obras Publicas, Mexico City, plans 175 mi. road Guadalajara-Barra de Navidad. **$1,600,000**.

▲ **Mexico, Salamanca**—FACTORY—Fertilizantes del Bajio, c/o Nacional Financiera, Mexico City, plans fertilizers factory. **$6,650,000**.

FOREIGN

▲ **Turkey**—Government of Turkey, Ankra, 2.5 mi. long, 164 ft. high bridge over Bosporus at Istanbul, **$50,000,000**. Dr. David B. Steinman, 17 Liberty St., New York, N. Y., U.S.A., consult. engr.

PUBLIC BUILDINGS

▲† **Ark., Helena**—POST OFFICE, etc.—General Services Admin., P. Bldgs., Service, 1114 Commerce St., Dallas, Tex., multi-storied, air-conditioned post office and federal bldg. in area bounded by Missouri, Franklin, Perry and Ohio Sts. **$1,020,000**.

▲ **Ark., Little Rock**—LIBRARY—City, City Hall, plans by Guy M. Swaim, c/o Swaim & Allen, Gazette Bldg., Little Rock, library. **$1,295,000**. CD 11/12.

▲ **Calif., Arcata**—SCHOOL—Arcata Union High School Dist., 1720 M St., bond election Nov. 26, school constr. **$1,200,000**.

▲ **Calif., Escondido**—SCHOOL—Escondido Union High School Dist., voted bonds Oct. 1, Escondido High School addn., Valley Campus. **$1,555,000**. CD 7/25.

▲ **Calif., Los Angeles**—CLASSROOM ADDNS., etc.—Bd. Educ., 1425 S. San Pedro St., plans by Lindsey & Lindsey, 6311 N. Figueroa St., classroom addns., incl. chemistry, earth science, life science, women's health and physical education, cafeteria, student store and administration building at East Los Angeles Junior College, East Los Angeles, **$2,475,000**. CD 3/29/56.

▲ **Calif., Modesto**—CITY HALL, etc.—City, City Hall, voted bonds Nov. 12, city hall and parking area. **$950,000**. Milton T. Pflueger, 580 Market St., San Francisco, archt. CD 10/31.

Calif., Mountain View—CIVIC CENTER—City, City Hall, bond election Jan. 14, civic center. **$575,000**.

▲ **Calif., Napa**—SCHOOL—Napa School Dist., c/o Supt., Jefferson St. and Park Ave. **$1,000,000** bond election Dec. 18, schools. CD 4/18.

▲ **Calif., Oxnard**—SCHOOL—Oxnard Union High School Dist., plans by Fisher & Wilde, 205 Ash St., Ventura, Hueneme High School, classroom wings. **$1,285,166**. CD 3/22.

Calif., Pacific Grove—CIVIC CENTER—City, City Hall, civic center. **$625,000**.

▲ **Calif., Petaluma**—SCHOOL—Petaluma City School Dist., 215 Post St., plans by Reynolds & Chamberlain, 3833 Piedmont Ave., Oakland, reconstr. Petaluma High School. **$4,000,000**. CD 12/15/54.

Calif., San Francisco—SHOPS, etc.—City and San Francisco Co., Dpt. P. Wks., City Hall, rebuilding Water Department Shops and Office Bldg., Bryant Street Yard. **$409,000**.

▲ **Calif., San Jose**—SCHOOLS—San Jose Unified School Dist., c/o Supt., 408 Almaden, **$11,557,000** bond election Feb. 18, schools and school addns. CD 2/15/54.

Colo., Lakewood—SCHOOL—School Dist. No. R-1, 1580 Yarrow St., plans by Ralph D. Peterson & Arthur Auburn Assocs., 1701 Gilpin, Denver, Wheat Ridge High School, Wheat Ridge, **$675,000**. CD 11/14/55.

▲ **Conn., Easton and Redding**—SCHOOL—Towns of Easton and Redding, Town Hall, Easton, plans by Lyons & Mather, 211 State St., Bridgeport. Regional Junior-Senior High School, Route 58. **$1,500,000**. CD 4/12.

Conn., North Branford—SCHOOL—Town, Town Hall, plans by Davis, Cochran & Miller, 29 Whitney Ave., New Haven, elementary school, Twin Lakes Rd. **$350,000**.

Conn., Stafford—SCHOOL—Town of Stafford, Bd. Educ., P. O. Box 147, Stafford Springs, plans by Keith S. Heine, 710 Oxford St., Hartford, Junior High School. **$640,000**. CD 10/3.

Del., Newark—FIELD HOUSE—University of Delaware, Newark, plans by Stanhope & Manning, 902 Orange St., Wilmington, Carpenter Field House. **$350,000**. Bids about Jan. 15, 1958.

Del., Newark—DORMITORY—University of Delaware plans by Stanhope & Manning, 902 Orange St., Wilmington, married students dormitory. **$550,000**. Bids early in 1958.

† **D. C., Wash.**—DORMITORY—General Services Admin., P. Bldg. Service, 19th and F Sts., N. W., plans by Irwin S. Porter & Sons, Metropolitan Bank Bldg., 40,000 sq. ft. men's dormitory at Gallaudet College. CD 11/9/56.

Fla., Gainesville—LABORATORY—Florida State Bd. Control, University of Florida, plans by James Gamble Rogers, Lovelock & Fritz, archts. and consult. engrs., 145 Lincoln Ave., Winter Park, and Guy C. Fulton, assoc. archt., Bldg. E. University of Florida, Gainesville, Plant Disease Laboratory. **$570,000**.

Fla., Tallahassee—NUCLEAR STUDIES and RESEARCH—Fla. Bd. Control, University of Florida, Admin. Bldg., plans by James Gamble Rogers, Lovelock & Fritz, consult. engrs-archts., 145 Lincoln Ave., Winter Park, Fla. Nuclear Studies & Research Bldg., Fla. State University. **$344,000**.

Fla., Venice—SCHOOL—Sarasota Co. Bd. P. Instruction, Supt. Office, Court House, Sarasota, plans by Mark Hampton, Stovall Professional Bldg., Tampa., Venice Junior High School. **$350,000**.

† **Idaho, Arco**—POWER REACTOR—Atomic Energy Comn., Idaho Operations Office, Idaho Falls, design natural uranium, gas cooled power reactor. Kaiser Engineers, 1924 Broadway, Oakland, Calif. and ACF Industries, Inc., 30 Church St., New York, N. Y., consult. engrs.-archts. CD 12/21.

Idaho, Burley—HOSPITAL—Cassia Co. voted $450,000 bonds, 50 bed county hospital, **$750,000**.

▲ **Idaho, Grangeville**—SCHOOL—School Dist. 241, voted bonds Oct. 31, classroom high school, **$1,000,000**; high school in Clearwater Valley, near here, **$750,000**. Bid call expected next March. CD 10/18.

▲ **Idaho, Lewiston**—SCHOOLS—School Bd. voted $1,500,000 bonds Nov. 5, 2 Junior High Schools, each costing **$650,000**. Culler, Gale, Martell & Norrie, Realty Bldg., Spokane, Wash., archts. CD 9/12.

▲ **Ind., Indianapolis**—OFFICE—State, State Office Bldg. Comn., Indianapolis, plans by Associated Indiana Architects, composed of Martin & Jelliffe, 6100 Millersville Rd., Indianapolis, Montana & Schulz, 1015 Hudson Ave., South Bend, Schaaf & Terzino, Laporte, James M. Turner, Hammond & Yeager, 822 Ohio St., Terre Haute, and Walker, Applegate, Oakes & Ritz, 218 Elsby Bldg., New Albany, office bldg., Washington St. and Senate Ave., to house the Employment Security Division, **$3,000,000**.

Iowa, Camanche—SCHOOL—Camanche Community School Dist. of Clinton Co., Camanche, plans by Kingscott & Assocs., 321 West Kimberly Rd., Davenport, Junior-Senior High School. **$400,000-$450,000**. CD 11/4.

▲ **Kan., Lawrence**—COLLEGE—Lawrence Public School, William D. Wolfe, supt. Schools, Lawrence, plans by C. K. Marshall, 110 Taylor St., Topeka, Junior College. **$1,000,000**. (**Correction**—owner). CD 7/12.

▲ **Ky., Ashland**—SCHOOLS—Bd. Educ., Ashland, plans by Joseph Baker & Assocs., 180 Hudson Ave., Newark, O., high school, 13th and Beech Sts., **$1,000,000**; elementary school, 29th and Beech Sts., **$900,000**; elementary school, **$900,000**. CD 11/12.

▲ **Ky., Ownesboro**—COURTHOUSE, etc.—Daviess Co. Fiscal Court, defeated bonds Nov. 5, courthouse and jail, **$1,500,000**. Max Bisson, Owensboro, archt. CD 8/6.

Mass., Acushnet—SCHOOL—Town, School Dpt., C. A. Gerber, chn. Bldg. Comn., Acushnet, plans by Israel T. Almy, 56 North Main St., Fall River, elementary school and Junior-High School, off Middle Rd. **$900,000**. Constr. 1958. CD 8/19/55.

▲ **Mass., Boston**—SURGICAL LABORATORY—City, Bd. Trustees Hospital Dpt., 818 Harrison Ave., plans by Shepley, Bulfinch, Richardson & Abbott, 1 Court St., Sears Surgical Laboratory for Boston City Hospital. **$1,000,000**. Bids in January.

▲ **Mass., Holyoke**—STEAM GENERATING UNIT—City, Gas & Electric Dpt., F. H. King, mgr., 70 Suffolk St., steam generating unit, 160,000 lb. per hr. **$1,250,000**. P. J. Kennedy & Co., 54 Canal St., engrs. Constr. 1958.

Mass., Weston—SCHOOL—Town, School Bldg. Comn., c/o Supt. Schools, School St., plans by Hugh A. Stubbins & Assoc., 806 Mass. Ave., Cambridge, elementary school, off Newton St. **$600,000**. Constr. 1958. CD 1/7.

▲ **Mich., Berkeley**—SCHOOL—City, Bd. Educ., 2325 Catalpa St., defeated bonds Nov. 12, Senior High School, Greenfield Rd. **$5,000,000**. Earl G. Meyer, 806 Farwell Bldg., Detroit, Zone 26, archt. CD 7/31.

▲ **Mich., Kalamazoo**—SCHOOL—City, Bd. Educ., Kalamazoo, plans by Perkins & Will, 309 West Jackson Blvd., Chicago, Ill., Senior High School. **$4,500,000**.

Mich., Mattawan—SCHOOL—Bd. Educ., Mattawan School Dist., Mattawan, high school. **$525,000**. Financing provided.

▲ **Mich., Portage**—SCHOOLS—Bd. Educ., Portage Twp. school dist., Portage, high school addn. and new elementary school. **$2,350,000**.

▲ **Mich., Spring Lake**—SCHOOLS—Bd. Educ., Spring Lake, voted bonds Nov. 12, Junior High School and addns. to elementary school, **$1,350,000**. CD 9/27.

Minn., Dodge Center—SCHOOL—Bd. Educ., Hattie Helmsbrecht, clk., voted $570,000 bonds Nov. 7, acquiring land, constr. elementary school addn., incl. new boiler room with 2 boilers, **$540,000**. Swanson & Wegleitner, 500 Sexton Bldg., Minneapolis, archts. Constr. 1958. CD 12/7.

▲ **Minn., Hopkins**—SCHOOL—Bd. Educ., R. B. Child, clk., Hopkins, voted **$1,950,000** bonds Nov. 12, Junior High School. Bissell & Belair, 1111 Nicollet Ave., Minneapolis, archts. CD 10/18.

Minn., LeRoy—SCHOOL—Bd. Educ., Dr. J. F. Sperry, clk., defeated **$800,000** bonds Nov. 9, school imprvs., incl. constr.

Minn., Minneapolis—SCHOOL—Bd. Educ., F. W. Hill, asst. supt. for Business Affairs, 807 N.E. Broadway, Floyd B. Olson Junior High School, 50th St. and Knox Ave. North, **$2,225,000**. (Correction—architects not selected). CD 11/14.

Miss., Greenwood—PLANT—City, City Hall, plant for Medart Locker, Inc., 3548 DeKalb St., St. Louis 18, Mo. **$350,000**.

Miss., Greenwood—PLANT—City, City Hall, plant addns. for Supreme Electronic, Inc. **$250,000**.

Neb., Omaha—SUB-STATION—Omaha Public Power Dist., 17th and Harney St., sub-station at Jones Street power plant. **$161,000**. A. G. Johnson, c/o owners. ch. engr.

▲ **N. J., Atlantic City**—CONVENTION HALL—City, City Hall, convention hall renovation and addn. to increase space 15,600 sq. ft., considerable addnl. electrical work. **$2,000,000**. Day & Zimmerman, 1700 Sansom St., Phila., Pa., consult. engrs. CD 7/11.

▲ **N. J., Elizabeth**—HOSPITAL—Bd. Freeholders Union Co., Court House, 200 bed addn. to John E. Runnell's Hospital for chest diseases, Bonnie Burn Rd., Berkeley Heights. **$3,000,000-$4,000,000**. CD 9/4.

▲ **N. J., Elizabeth**—SCHOOL—City, City Hall, plans by Pohlnan & Henry, 1140 E. Jersey St., Battin High School addn. or new high school. **$3,387,530-$4,485,300**. Site not acquired.

N. J., Green Brook (Dunellen P. O.)—SCHOOL—Bd. Educ., Green Brook Twp., plans by Epple & Seaman, 901 Broad St., Newark. Green Brook School addn. **$475,000**.

N. J., Jersey City—POLICE HEADQUARTERS—Bd. Freeholders Hudson Co., Court House, plans by Barnett D. Singer, 15 Benmore Terrace, Bayonne, police headquarters, 3058 to 3076 Hudson Blvd. **$650,000**.

† **N. J., Long Branch**—POST OFFICE—General Services Admin., 18th and F Sts. N.W., Wash., D. C., plans by James W. Mancuso, 9 Memorial Parkway, extension to U. S. Post Offices, **$363,000**.

▲ **N. J., North Haledon**—SCHOOL—Prospect Park-North Haledon Regional High School Dist. plans by Frederick Wiedersum Assocs., 65 Roosevelt Ave., Valley Stream, N. Y., high school. **$1,315,000**. CD 7/3/56.

(Continued on page 154)

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(Continued from page 152)

N. J., Secaucus—LAUNDRY—Bd. Freeholders Hudson Co., Court House, Jersey City, plans by Barnett Singer, 15 Benmore Terrace, Bayonne, laundry bldg. **$345,000.**

▲ **N. M., Albuquerque**—STUDENT UNION—University of New Mexico, plans by Meem, Holien, Buckley & Assocs., 785 Camino Del Monte Sol., Santa Fe, student union **bldg. $3,000,000.** CD 11/15.

▲† **N. M., Las Cruces**—OPERATIONAL, etc.—U. S. Eng., P. O. Box 1538, **Albuquerque,** operational and training facilities, maintenance **facilities,** research and development facilities, storage facilities, administrative facilities, troop housing, community facilities and utilities, White Sands Provng Ground. **$16,530,000.**

▲ **N. Y., Bethpage**—SCHOOL—Bd. Educ., Bethpage, plans by Frederick P. Wiedersum Associates, 85 W. Hawthorne Ave., Valley Stream, Junior-Senior High School, Broadway and Cherry Ave. **$4,500,000.** CD 11/7.

▲ **N. Y., Jamaica**—LIBRARY—Dpt. P. Wks., Municipal Bldg., New York, Zone 7, plans by York & Sawyer, 101 Park Ave., New York, Zone 17, Proj. L-39, Central Branch, Northwest Wing of library alterations, 89-14 Parsons Blvd. **$4,000,000.** To go ahead in 1958.

N. Y., New York—POLICE STATION—Dpt. P. Wks., Municipal Bldg., Zone 7, plans by Knappe & Johnson, 390 E. 155 St., New York, Zone 55, Proj. PO-66, 24th Precinct Station House for Police Dpt., vicinity of 100 St. and Amsterdam Ave. for Police Dpt. **$798,000.**

N. Y., New York—LIBRARIES—Dpt. P. Wks., Municipal Bldg., Zone 7, Proj. L-99, Hamilton Fish Branch of Public Libraries, south side of E. Houston St. between Columbia and Sheriff Sts. **$400,000.**

▲† **N. Y., Syracuse**—HOUSING—Procurement Office, Syracuse Air Force Base, Syracuse, plans by Hugh Johnson Assoc., Inc., 2000 P St. N. W., Wash., D. C., 216 unit Capehart Housing. **$3,000,000.** Bids soon.

N. D., Minot—DORMITORIES, etc.—State Bd. Higher Educ., Bismarck, plans by Brunner, Foeffel & Bohrer, Minot, dormitories at State Teacher College. **$450,000;** library. **$400,000.** Bids in February. CD 12/16/55.

▲ **O., Chillicothe**—SCHOOLS—Bd. Educ., **Chillicothe,** voted **$4,500,000** bonds, schools. CD 11/17/47.

▲ **O., Cleveland**—SCHOOLS—Bd. Educ., 1380 E. 6 St., Zone 14, plans by Arthur Baer, c/o owner, school, south of Euclid Ave. east of 55 St., **$1,010,625;** new Tarkington School, **$893,000;** school, south side of Euclid Ave., west of 55 St., **$1,650,000;** replacing Orchard School, **$730,250.** Longwood School, **$1,150,000;** gymnasium enlargement at East Tech High School, **$460,000.** CD 11/11.

▲ **O., Columbus**—REHABILITATION CENTER—Ohio Dpt. P. Wks., State Dpts. Bldgs., **Columbus,** plans by Dan A. Carmichael, 5 E. Long **St., 2** story, 65-bed Rehabilitation Center for physical handicapped, in medical center area of Ohio State University campus, south of tuberculosis hospital. **$1,250,000.**

▲ **O., East Cleveland** — SCHOOLS — **Bd. Educ.,** 1849 Shaw Ave., voted **$850,000** bonds schools. CD 6/19.

▲ **O., Marietta**—SCHOOLS—Bd. Educ., Warren Local School Dist., Marietta, voted bonds school. **$3,300,000.**

O., North Olmsted—SCHOOL—North Olmsted Bd. Educ., 27573 Butternut Ridge Rd., plans by Mellenbrook, Foley & Scott, 20 Beech St., Berea, elementary school. **$650,000.** CD 11/12.

O., Paulding—HOSPITAL—Comrs. Paulding Co., Court House, defeated bonds Nov. 5, county hospital. **$495,000.** CD 10/7.

O., Sandusky—SCHOOL—Bd. Educ. Margaretta School Dist., Sandusky, voted bonds Nov. 5, grade school. **$775,000.** CD 8/7.

O., Twinsburg—SCHOOL—Twinsburg Bd. Educ., Town Hall, plans by Fulton DelaMotte & Assocs., 6014 Euclid Ave., Cleveland, Zone 3, high school addn. **$660,000.**

O., Upper Arlington (P. O. Columbus)—SCHOOLS—Bd. Educ., Walter B. Heischman, supt., 2100 Devon Rd., Columbus, bond election Feb. 18, grade school at Barrington Rd., addn. to Tremont and Wickliffe Schools. **$960,000.**

▲ **O., Van Wert**—SCHOOLS—Van Wert Bd. Educ., bond election May 6, schools. **$1,700,000.** CD 11/12.

O., West Milton—SCHOOL—Milton-Union School Dist., West Milton, voted bonds Nov. 5, elementary school. **$625,000.** CD 8/7.

Pa., Newtown Square—SCHOOL—Newtown Twp. School Dist., Newtown Square, plans by Baader, Young & Schultze, 1500 Walnut St., Phila., elementary school, Goshan Rd. **$509,900.** Chester I. Duncan, 225 S. 15 St., Phila., engr. Bids in 1 month.

Tenn., Memphis—LIBRARY—City, Cossitt Library, plans by Walk C. Jones, Jr., 1215 Poplar Ave., 2 story library with walls of the ground floor to be of glass and granite. **$600,000.**

▲ **Tex., Dallas**—WORLD TRADE—State Fair of Texas, c/o Fair Park, Dallas, plans by Donal S. Nelson, 505 N. Ervay St., World Trade Bldg. (strictly for exhibition purposes) **$2,500,000-$3,000,000.**

▲ **Tex., Gainesville**—HIGH SCHOOL, etc.—Ind. School Dist., c/o Dr. J. M. Kearnes, supt., plans by Wilson, Patterson & Assocs., 601 Bailey St., Fort Worth, high school, admin. bldg. and Junior College Bldg. **$1,500,000.** CD 11/11.

Tex., Stephenville—DORMITORY—Tarleton State College, plans by Hedrick & Stanley, 1200 T&P Bldg., Fort Worth, 3 story, brick, tile concrete men's dormitory. **$550,000.** CD 6/14, under Tex. College Station, and A&M College as owner.

▲ **Utah, Ogden**—SCHOOL—Weber County School Bd., T. H. Bell, supt., 1122 Wash Blvd., plans by Keith W. Wilcox & Assocs., 410 Kiesel Bldg., Senior High School, in South Ogden or Washington Terrace area. **$1,750,000.** CD 10/7.

▲ **Utah, Provo**—POWER PLANT—Provo City Corp., Earl Udall, city mgr., City-County Bldg., enlarging power plant. **$2,000,000-$3,000,000.** CD 10/29/47.

Wash., Vancouver—LIBRARY—Clarke-Skamania Inter-County Rural Library Bd., 1511 Main St., bond election Feb. 14, library. **$600,000.** CD 9/7/56.

W. Va., Wheeling—DORMITORY—State of West Virginia, Huntington, 4 story dormitory, Proj. No. W. Va. 46-CH-11 (DS). **$820,000.**

Que., Sherbrooke—HOUSING—Dpt. Veterans' Affairs, Daly Bldg., Ottawa, Ont., Veterans' Housing, 61 houses, 85 acre site, Rock Forest near west limits of here. Over **$350,000.**

COMMERCIAL BUILDINGS

▲ **Calif., Lancaster**—SUBDIVISION—Georg, M. R. and H. R. Terry, 3587 Beverly Glen Blvd., Los Angeles, 96 lot subdivision in Tract 24140 at Ave. H and 30th St. **$1,000,000.** Ganns Surveys, 44413 N. Sierra Hy., Lancaster, consult. engr.

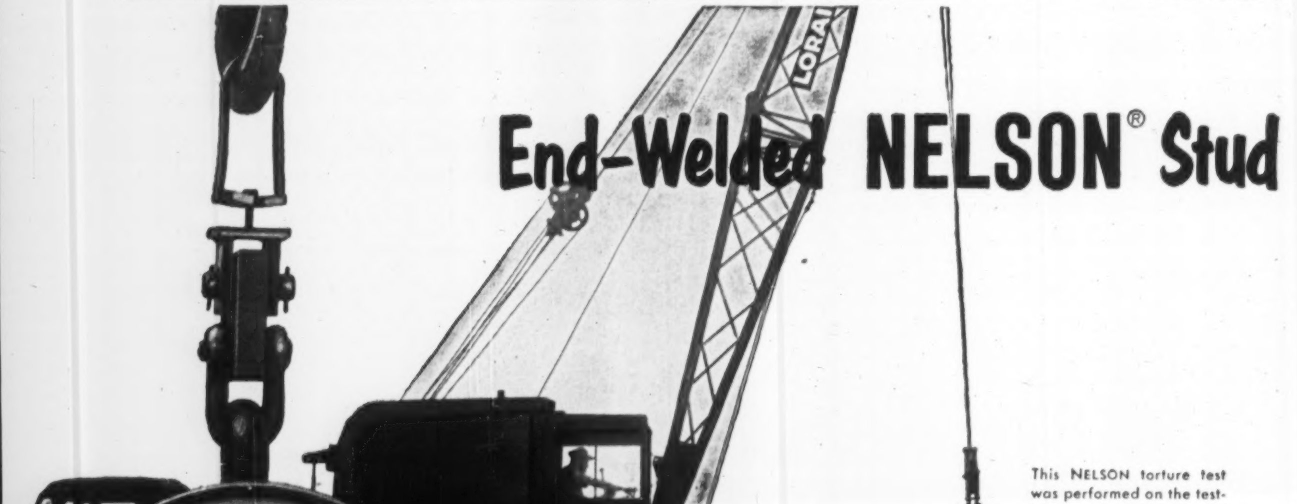
Calif., LaVerne—DORMITORY—LaVerne College, LaVerne, plans by Frederick Kennedy, Jr., 1041 East Green St., Pasadena, Zone 1, dormitory and separate dining hall Proj. No. Calif. 4-CH-30 **$369,000.** CD 11/11.

Calif., Los Angeles—SUBDIVISION—Earl Lochman, 337½ Washington St., Venice, 54 lot subdivision in tract 23393 at Marquez and Chattanooga Aves., West Los Angeles Dist. **$550,000.** Scott, Blake & Wynne, 8418 W. 3 St., consult. engrs.

▲ **Calif., Norwalk**—SUBDIVISIONS—George W. Holstein, 166 17 St., Costa Mesa, 43 lot subdivision in Tract 24177, Imperial Hy. and Luitweiler Ave., **$430,000;** 44 lot subdivision in Tract 24145, Imperial Hy. and Luitweiler Ave., **$450,000;** 65 lot subdivision in Tract 24178, Imperial Hy. and Luitweiler Ave., **$650,000,** Jennings Eng. Co., 9219 W. Pico St., Los Angeles, consult. engr.

Conn., Bolton—SHOPPING CENTER—Andrew Ansaldi Co., Bidwell St., Manchester, plans by Scudieri & Mankey, 627 Main St., Manchester, "Bolton Shopping Center". **$350,000.**

Conn., Colchester—HOUSING—Barber & Stevens, Inc., 36 Woodland St., Hartford, 41 Houses "Holiday Homes", Parum Rd., **$489,950.**



End-Welded NELSON® Stud

This NELSON torture test was performed on the testing platform at Thew Shovel Company, Lorain, Ohio. The equipment is a 30-ton Lorain Moto-Crane.

Close-up of Hydroscale measuring the 16,000 lbs. of tension against the end-welded NELSON stud. In the interest of safety, the test was not carried out to the point of destruction.

NELSON STUD WELDING . . .

Conn., Hartford—DEPARTMENT STORE—Enterprise Dpt. Stores, Inc., 1050 Commonwealth Ave., Boston, Mass., 60,000 sq. ft. department store, New Park Ave. $600,000.

Conn., Middletown—SHOPPING CENTER—Grand Union Co., 100 Broadway, East Paterson, N. J., shopping center. South Main St. $350,000.

Conn., New Haven—STORES, etc.—Edgewood Realty Corp., 299 George St., plans by Samuel Gitlitz, 60 Ogden St., 4 story, store and office bldg., 299 George St. $350,000.

Conn., New Haven—STUDENT CENTER—Hopkins Grammar School, 986 Forest Rd., plans by Schilling & Goldbecker, 18 Trumbull St., brick student center bldg. and auditorium, Forest Rd. $345,000. CD 6/3/49.

▲ **Conn., Newington**—HOUSING—Schnier & Shlomberg, 18 Raymond Rd., West Hartford, 110 houses "Knollwood Acres". $1,978,900.

▲ **Conn., West Hartford**—SHOPPING CENTER, etc.—Bishop's Plaza, Inc., c/o Irving J. Feder, 369 Lexington Ave., New York, N. Y., brick, stone front Shopping Center and Office Bldg., N. Main St., Bishop's Corners stores, 345,000 sq. ft., offices 50,000 sq. ft. on second floor. $1,500,000.

D. C., Wash.—PHYSICAL EDUCATION—Sidwell Friends School, 3825 Wisconsin Ave. N. W., plans by McLeon & Ferrara, 1200 18th St. N. W., physical education bldg. $350,000.

Fla., Bay Harbor Island—APARTMENT—Florida Enterprises, c/o Donald J. Reiff, archt., 600 Lincoln Rd., Miami Beach, 3 story, 105x133 ft., concrete pile (irreg.) apartment, 94th and E. Bay Harbor Dr. $400,000.

▲ **Ill., Chicago**—HOUSING—Pride Homes, Inc., 5003 W. Irving Park Rd., plans by Howard Weinper, 2735 W. Devon Ave., home development of Chicago-Northwest Estates, 4200 N. Mobile Ave., $1,000,000.

Ind., Kokomo—HOSPITAL—St. Joseph Memorial Hospital, Kokomo, plans by Walter Scholer & Assocs., 1114 State St., Lafayette, 3 story, 72x91 masonry, steel, concrete hospital addn. $600,000. CD 3/28.

Iowa, Cedar Rapids—STORE—Armstrong Dpt. Store, 204 2 Ave. S.E., plans by Abbet & Griswold, Foshay Tower, Minneapolis, Minn., store addn. $400,000.

▲ **Iowa, Davenport** — HOUSING — Davenport Garden Homes, 316 Brady St., housing development. $5,000,000.

▲ **Kan., Wichita**—SHOPPING CENTER—William Levitt & Assocs., 323 W. Murdock St., shopping center, Kellogg St. and Rock Rd. $2,500,000.

Mass., Fall River—DORMITORY, etc.—St. Anne's Hospital, 795 Middle St., plans by Israel T. Almy, 56 North Main St., School of Nursing and dormitory. Approx. $350,000. Constr. 1958.

▲ **Mass., Rowley**—RESIDENTIAL DEVELOPMENT—A. J. Tambone, Inc., 88 Main St., Reading, residential development, Feno Estate, 250-acres, private lake, etc. $2,700,000. Constr. 1958.

▲ **Mass., West Andover and North Tewksbury**—RESIDENTIAL DEVELOPMENT—Alton Properties, Inc. (Sub. A. J. Tambone, Inc.) 88 Main St., Reading, residential development "Ames Lake and Woods", 700 acres-lake-woods, incl. 1 mi. frontage, Rtes. 133 and 28, $7,000,000. Constr. 1958-59 and 60.

Mich., Detroit—DORMITORY—Marygrove College, 8425 W. McNichols, plans by Roger Allen & Assocs., 1126 McKay Tower, Grand Rapids, Zone 2, dormitory, Proj. Mich. 20-CH022(3). $565,000. CD 11/13.

▲ **Mich., Novi**—HOMES, etc.—Thompson-Brown Co., 19426 Grand River, Detroit, Zone 23, 2,000 homes on 700 acres, incl. sewer and water mains, sewage plant, shopping center, motel and restaurant, blacktop roads. $40,000,000.

Mo., Independence—SHOPPING CENTER—Sam Wolff Constr. Co., 3837 W. Pine St., St. Louis, 120 x 310 ft., 33,000 sq. ft., masonry with steel deck, brick facing, air-conditioned shopping center, US 24 and River Rd. $350,000.

▲ **Mo., St. Charles**—HOSPITAL—St. Joseph's Hospital, Sisters of St. Mary, 218 Clay St., plans by Drake-O'Meara Assocs., 212 S. Bemiston Ave., Clayton, Zone 5, 5 story, brick, rein.-con., etc. hospital addn. $1,000,000. Fund rasing campaign started. CD 2/28.

▲ **Mo., St. Louis**—HOTEL, etc.—Royale Investment Co., Bernard H. Tureen, pres., Hotel Kingshighway, Zone 8, plans by Arthur B. Rather & Lester O. Roth, 4401 Hampton Ave., Zone 9, altering hotel and new 2 story motel. $1,500,000. CD 1/3/55, under Albert Fein, et al, c/o Kingsway Hotel, as owner.

▲ **Neb., Nebraska City**—HOSPITAL—St. Mary's Hospital, Nebraska City, plans by John Latenser & Sons, 1307 Farnam St., Omaha, hospital addn. $1,400,000. Bids in January. CD 2/27/56.

N. J., Atlantic City — MOTEL — Howard I. Jacobson, Guarantee Trust Bldg., motel, South Carolina and Pacific Aves. $344,000.

N. J., Atlantic City—MOTEL, etc.—Mayflower Hotel, Tennessee Ave. and Boardwalk, motel, incl. swimming pool and parking area. $350,000.

N. J., Madison—CHAPEL—Grace Episcopal Church, 4 Madison Ave., chapel addn. $350,000.

N. J., Morris Twp. (Morristown P.O.)—SCHOOL—Delbarton School (Community of St. Benedict), Mendham Rd., Morristown, plans by Henry Dagit, 1329 Race St., Phila., Pa., 3 story, 56x209 ft., stone, brick classroom, 380 acre campus. $750,000.

▲ **N. J., Newark**—YMHA-YWHA CENTER—Jewish Community Foundation of Essex Co., 30 Clinton Ave., plans by Edwin Gerber & Azeglio Pancani Jr., and Allan H. Grossman, 11 Commerce St., YMHA-YWHA Center, Chancellor Ave. and Aldine St. $1,000,000. CD 11/23/56.

▲ **N. J., Newark**—OFFICE—Mutual Benefit Ins. Co., 300 Broadway, 15 story office bldg., Washington and Broad Sts., $5,000,000; plans by Frank Grad, 11 Commerce St., 12 story office bldg., Broad and Fulton Sts., $4,000,000. CD 10/29/56.

N. J., Parsippany-Troy Hills—SCHOOL, etc.—Archdiocese of Paterson, Parish St. Peter the Apostle, Baldwin Rd., Parsippany, plans by Fanning & Shaw, 49 Ward St., Paterson, parochial elementary school, social center and convent, $650,000. Expect to start immediately.

N. J., Ship Bottom—MOTEL, etc.—Shoreland Constr. Co., 250 Mechanic St., Red Bank, 100 unit motel with swimming pool and parking area. $500,000.

▲ **N. Y., New York**—APARTMENT—Owner, c/o Paul Resnick, 654 Madison Ave., New York, N. Y. and Harry F. Green, assoc. archt., 654 Madison Ave., 16 story, apartment, 35 E. 75 St. Over $5,000,000.

N. Y., New York—APARTMENT—Redstone Development Corp., 44 Court St., Brooklyn, Zone 2, plans by Kavy & Kavovitt, 44 Court St., Brooklyn, Zone 2, apartment, 101-13 W. 23 St., $800,000.

N. D., Minot—HOSPITAL—St. Joseph's Hospital, Minot, plans by Hills, Gilbertson & Hayes, 6080 Wayzata Blvd., Minneapolis, Minn., hospital addn. $400,000.

▲ **O., Barberton**—OFFICE—Babcock & Wilcox Co., 161 E. 42nd St., New York, N. Y., office bldg (which will house engr. acct. and sales offices), $2,000,000.

▲ **O., Columbus**—APARTMENTS—Wm. A. Davis, c/o Robert Teaford, atty., 50 W. Broad St., 50 apartments, on 32-acre site, Courtwright Rd. $2,000,000.

▲ **O., Youngstown**—HOSPITAL—Youngstown Hospital Assn., c/o David E. Jones, Gypsy Lane, plans by Kling & Frost, 661 Wick Ave., addn. to North Side Hospital, $2,000,000. CD 1/7.

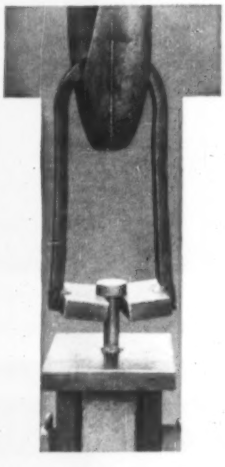
▲ **Okla., Tulsa**—SCHOOL—Catholic Diocese, 743 N. Denver St., Catholic High School, 51st and Harvard in South Tulsa. $1,000,000.

Pa., Media—SHOPS—Williamson Free School of Mechanical Trades, Media, plans by Massena & Du Pont, 704 Delaware Ave., Wilmington, Del., 5 shop bldgs., $500,000. CD 3/29. Bids about Jan. 1.

▲ **Pa., Phila.**—HOTEL—Albert M. Greenfield & Co., 1325 Walnut St., plans by Vincent G. Kling, 917

(Continued on page 158)

Resists 8-Ton Load!

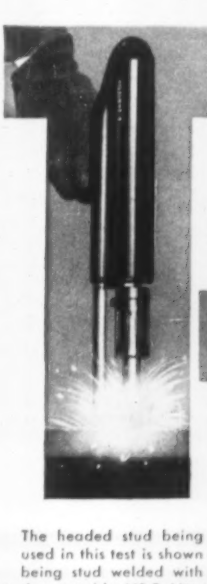


Close-up of stirrup used to complete the linkage between test stud and the crane cable hook. Photo was taken while stud was under full 16,000-lb. load. Bent stirrup indicates force of this grueling test.

• Nelson Engineers tested a 5/8" diameter standard headed stud to determine the strength of the weld. These photographs attest to the amazing tensile strength of a NELSON end-welded stud. Torsion and shear strength are equally amazing.

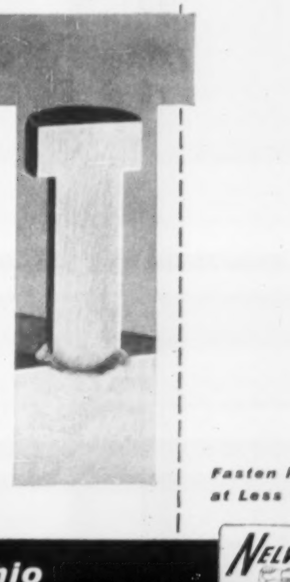
Holding power like this suggests that it pays to stop before drilling a hole and consider the NELWELD® method of fastening... the system that also saves time, eliminates flanges and bosses and makes "hole engineering" unnecessary.

The manual offered in the coupon goes into detail on design and applications, and recommended torque and tensile loadings of studs for normal applications.



The headed stud being used in this test is shown being stud welded with the portable NS-9 NELWELD Gun. These studs are often used as shear connectors on concrete and steel composite bridges. Threaded studs, and a multitude of standard types and sizes are available for manufacturing and construction.

Reason for strength... cut-a-way view of stud shows complete fusion of stud and base plate.



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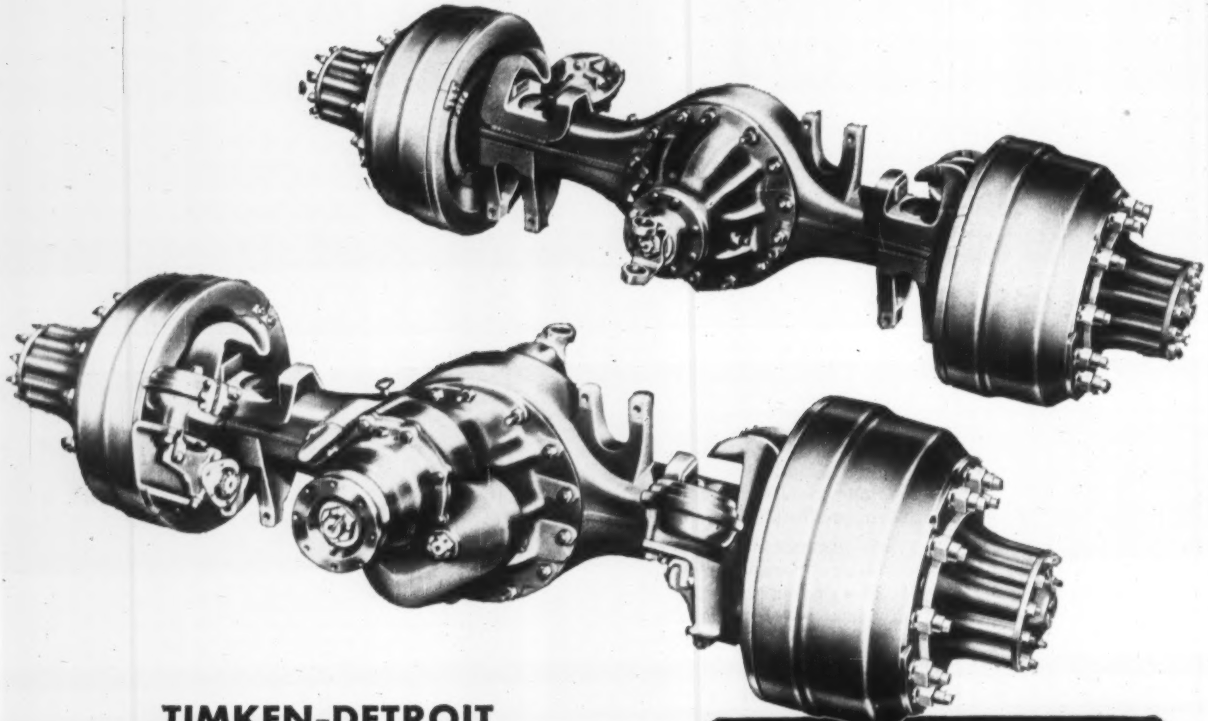

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Rockwell Spring and Axle Co.

TIMKEN-DETROIT HEAVY-DUTY TANDEM

with large rugged double-reduction gears is unequaled for dependable, economical operation under toughest conditions. Exclusive "Cradle Ride" suspension, with its long, resilient, floating springs, reduces road shock, stabilizes the load, and improves driver control. Some Timken-Detroit medium and heavy-duty tandems are available with worm drive.

ONLY TIMKEN-DETROIT OFFERS YOU ALL THESE EXCLUSIVE FEATURES AND ADVANTAGES!

Timken-Detroit Inter-Axle Differential divides torque evenly between axles, yet permit wheels of one axle to revolve faster or slower than wheels of other axle. Both axles do equal amounts of work. Driving parts and tires last longer. Controlled from the cab, the differential can be locked out at any speed to give positive through-drive.

Timken-Detroit "In-Line" Propeller Shaft Drive gives you straight-through drive. Bearing and gear life is greatly increased because universal joint working angles are materially reduced.

Unequaled Parts Interchangeability means easier maintenance. Almost all parts in TDA® tandems—gears, pinions, differentials and brakes—are interchangeable with parts from Timken-Detroit standard single axles. This means more productive operation time—fast, simple, economical maintenance, smaller parts inventory.

Famous Torsion Flow Axle Shafts are made even stronger through the use of more splines and greater root diameter.

Timken-Detroit Rectangular Shaped Axle Housings are forged from high carbon steel. This shape, plus TDA full strength corner sections, provides greatest strength possible with minimum weight and size.

Timken-Detroit Hypoid Gears with their larger pinions and greater tooth contact give outstanding performance, top efficiency and long life—plus lower maintenance costs.

Dependable Heavy-Duty "P" Series Air Brakes utilize a unit-mounted design to make a compact self-contained assembly. Open type spiders mean lower temperatures, longer liner life. Tapered "Econoliners" provide greatest thickness in area of greatest wear.

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WORLD'S LARGEST MANUFACTURER OF AXLES FOR TRUCKS, BUSSES AND TRAILERS

(Continued from page 155)

Corinthian Ave., Phila., Pa., and Edward D. Stone, consult. archt., 50 E. 64 St., New York, N. Y., apartment hotel, $7,000,000. CD 1/19/55.

Pa., Phila.—STUDENT UNION—Lutheran Theological Seminary, 7301 Germantown Ave., plans by T. Norman Mansell, 1831 Chestnut St., student union bldg. $500,000.

Pa., Southampton—SCHOOL, etc.—Our Lady of Good Council Roman Catholic Church, Southampton, plans by Haag & D'Entremont, Jenkintown, Pa., church school, rectory and convent, $400,000.

Tex., El Paso—DWELLINGS—J. C. Yarborough, 1812 Hunter Rd., 36 concrete slab, brick exterior dwellings, in Scotsdale Addn. $355,000.

▲ **Tex., Houston**—DWELLINGS—Clarence Barnes, Developer, Builder, c/o 2505 Bluebonnet, Houston, 14 dwellings, $350,000; 16 dwellings, $377,100; 18 dwellings, $386,450, Memorial Way Subdivision.

Tex., Houston—HOME—Central Church of Christ, 4602 Richmond St., plans by Herman Kelling, 2728 Wesleyan St., Home for the Aged, 3601 N. MacGregor Dr. $400,000, Ira Jack Castles, 20 N. Sampson St., and Jas. H. Howard & Assocs., 2728 Wesleyan St., consult. engrs. Bids after Jan. 1. CD 4/13/56.

▲ **Tex., Houston**—OFFICE—Fish Eng. Corp., c/o M&M Bldg., office, 5 acre site on Buffalo Dr. $1,500,000. Constr. 1958.

▲ **Tex., Houston**—OFFICE—The Texas Co., 720 San Jacinto, plans by Kenneth Franzheim, 802 Lovett St. and Chas. S. Chase, consult. archt., 2317 Bissonet, 16 story office. $5,500,000. H. E. Bovey, Jr., 5009 Carolina St. and Ward Butterwick, 811 Lovett St., consult. engrs. CD 8/2.

Tex., Odessa—DWELLINGS—Empire Development Co., Inc., Odesso, 28 brick veneer, concrete floor slab dwellings. $353,100.

Tex., Pasadena—CHURCH—Boulevard Baptist Church, plans by Smart & Whitehead, 2073 Kipling St., Houston, church. $500,000. CD 1/23.

▲ **Tex., San Antonio**—HOME FOR AGED—Methodist Church c/o Dist. Bd. for Homes for Aged Adults, c/o Leland S. Austin, National Bank Commerce, plans by Marmon & Mok and William Jones, c/o South Texas Bldg., Methodist Home for Aged, Babcock Rd. near proposed medical center $1,500,000; Methodist Home for Aged, Babcock and St. Cloud Rd. $1,000,000. CD 11/13.

▲ **Wash., Seattle**—APARTMENT—A. A. Hunt, 3005 Market St., plans by C. A. Baylon & Assocs., 912 Eliot Ave. W., 11 story, 124 unit steel frame Parkwood Apartment, 502 Olympic Place. $1,500,000.

▲ **Wash., Seattle**—BANK—National Bank of Commerce, 2nd Ave. and Spring St., Zone 4, plans by G. W. Stoddard-Huggard & Assocs., 1120 Harvard Ave., Zone 2, 5 story, 80,000 sq. ft., steel frame and rein.-con. addn. to bank bldg. $1,000,000. Bids to be called later next month.

Wis., Pewaukee—INFIRMARY—Sisters of St. Dominic, plans by Al Seitz, 216 5 St., Racine, 3 story, bsmnt., 60x325 ft. and 60x130 ft. rein.-con., brick, stone, granite and blocks infirmary.

Wis., Prairie du Chien—RESIDENCE HALL—Campion Jesuit High School plans by E. Brielmaier & Sons Co., 735 N. Water St., Milwaukee, Zone 2, 4 story, bsmnt. 40x300 ft. residence hall. $800,000.

▲ **Alta., Edmonton**—HOTEL—E. J. Carline & Assocs., Edmonton, 11 story Hotel, topped by a 5 story parkade and heliport, $5,000,000.

▲ **Ont., Byron**—HOUSING—J. W. Smith Constr. Co. Ltd., 70 Barker St., London, plans by Graham & Graham Ltd., R. R. 1, London, housing project, consisting of 200 houses, 1 story, split level, brick veneer walls, asphalt shingle roofs. $2,000,000.

▲ **Que., Joliette**—SEMINARY, etc.—Le Siminaire de Joliette, Rue St. Charles Borromee, Joliette, plans by Audet & Blais, 436 rue Lindsay, Drummondville, Seminary Chapel and Academic Hall. $3,000,000.

Que., Laval des Rapides—HOUSING—Gelinas & Lalone Constr. Ltee., 64 Marial St., Laval des Rapides, 29x38 ft., bsmt., brick walls, housing program, concrete fdn., DuCrochet St. $750,000. Constr. spring 1958.

Que., Montreal—HOUSING—Neo Constr. Inc., 2 Church St., Dorval, plans by Emilien Bujold, 6746 Molson St., 25-split level homes, $350,000.

Que., Montreal—MOTEL—Owner, c/o Notary Jean Noel Lavoie, 3621 Blvd. Levesque, L'Abord a Plouffe, plans by Maurice Bouchard, 376 rue du Roi, Quebec City, motel, rectangular bldg., front 24 & 92 ft., 2 stories with 46x435 ft. and 46x234 ft. wings, frame, brick walls, etc., concrete fdns. with swimming pool, Cote de Liesse Rd., near Dorval Airport, Over $350,000.

INDUSTRIAL BUILDINGS

Ala., Oneonta—PLANT—Pride of Virginia Poultry Corp., New Market, Va., plans by Philip Kesller, 1806 7 Ave. N., Birmingham, poultry processing plant. $300,000.

▲ **Ariz., Ash Fork**—PLANT—Arizona Portland Cement Co., Rillito, cement plant. $12,000,000.

Conn., East Hartford—WAREHOUSE, etc.—Martin O'Meara, 653 Conn. Blvd., 3 story brick warehouse, 673 Conn. Blvd. $100,000.

Del., Harrington—PLANT—The Trane Co., 206 Cameron Ave., La Crosse, Wis., mfg. plant. $300,000. Site purchased.

Ill., Blue Island—FACTORY, etc.—Malanco, Inc., 2200-138th St., plans by Jules Marling, 8 S. Michigan Ave., Chicago, 1 story factory and office addn., 2200-138th St. $100,000.

▲ **Ill., Chicago Heights**—MILL—Chicago-Calumet Div., Borg-Warner Corp., 310 S. Michigan Ave., Chicago, Zone 4, combination rail, axle and billet heating furnace, roll conditioning and machine shop, fence post finishing shop, merchant bar finishing and reinforcing bar fabrication shops addns., stands and tables for present 14 in. rolling mill, imprv. tube mill, material yard, etc., $10,000,000, to be completed Dec. 1959; (2nd section) electrical furnaces, addnl. rolling and finishing facilities, to be completed mid 1961.

Ill., Skokie—PLANT—Lawter Chemical, Inc., 3550 Touhy Ave., plans by W. Fred Dolke, 189 W. Madison St., Chicago, 8,000 sq. ft. plant addn. $100,000.

Ind., Indianapolis—STOCKYARDS, etc.—Belt Rail Road and Stock Yards Co., Exchange Bldg., plans by C. Wilbur Foster & Assocs., 4741 E. Washington St., modernize stockyards, incl. steel and asbestos ventilated bldg. $300,000.

▲ **Ky., Prestonburg**—COMPRESSOR UNITS—Atlantic Seaboard Corp., 1033 Quarrier St., Charleston, W. Va., two gas driven compressor units at Boldman Compressor Station, near here. $1,600,000.

Ky., Shelbyville—STORAGE, etc.—Shelby Rural Electric Co-operative Corp., Shelbyville, (A) 11,000 sq. ft. storage and office bldg., (B) distribution lines, Shelby Co. $425,000. Bids in March. Quinten Biagi, Shelbyville, consult. engr. CD 7/17, under Commercial Buildings.

▲ **Mich., Dundee**—PLANT—Dundee Cement Co., c/o St. Lawrence Cement Co., Clarkston, Ont., Canada cement plant. $8,000,000.

▲ **Mich., L'Anse**—PLANT—Upper Peninsula Power Co., 616 Shelden Ave., Houghton, power generating plant. $5,000,000.

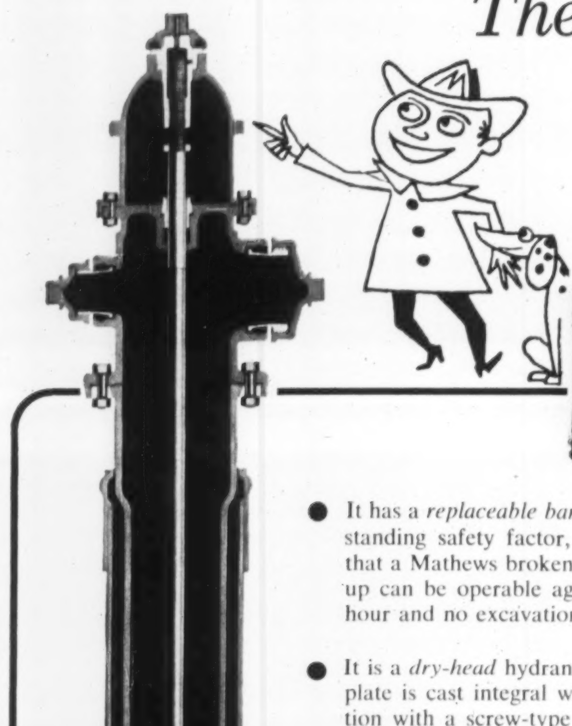
Minn., Duluth—EQUIPMENT—Universal Atlas Cement Co., Morgan Park, Duluth, equipment building at site; 41x170 ft. dust elimination equip. enclosure with 3 platform levels. $160,000.

▲ **Mo., St. Louis**—BUS TERMINAL, etc.—Southwestern Greyhound Lines, E. F. Freeman, pres., 210 E. 9 St., Fort Worth, Tex., bus terminal, Market St. between 15 and 17 Sts. or in the Mill Creek Valley area, $3,000,000; car rental service facilities and offices, downtown section of city, $1,000,000.

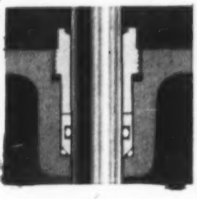
Neb., Omaha—SHOP and WAREHOUSE—Goodwill Industries, Inc., 1013 N. 16 St., plans by John Latenser & Sons, 1307 Farnam St., shop and warehouse bldg. $300,000.

MATHEWS

The finest



O-Ring seal available when specified



- It has a *replaceable barrel.* This is an outstanding safety factor, because it means that a Mathews broken in a traffic smash-up can be operable again within half an hour and no excavation is necessary.
- It is a *dry-head* hydrant. The stuffing box plate is cast integral with the nozzle section with a screw-type stuffing box. This and the shield operating nut prevent abrasion, rust, corrosion or ice from interfering with the operating thread. It is always ready, no matter how severe the conditions.

Made by

▲ **N. J., Cinnaminson Twp. (Palmyra P. O.)**—PLANT—Shell Oil Co., 50 West 50 St., New York, N. Y., plant for making synthetic resin and plastic and associated processing units. **$2,000,000.**

▲ **N. J., Linden**—FACTORY, etc.—Hatfield Wire & Cable Div. of Continental Copper & Steel Industries, Hillside, plans by Frank Grad & Sons, 11 Commerce St., Newark, 280,000 sq. ft. factory and warehouse on 62 acre site at Stiles St., St. George Ave. and Linden Rd. **$5,000,000.** Constr. in 1958. CD 2/8.

N. J., Livingston—MANUFACTURING, etc.—G-V Controls, Inc., 41 Hollywood Plaza, East Orange, plans by Frank Grad & Sons, 11 Commerce St., Newark, 1 story, 165x200 ft., brick veneer, concrete manufacturing and office bldg. **$500,000.** May ask for bids in 2 or 3 months. CD 11/9/56.

N. J., Toms River—PLANT, etc.—Ciba Pharmaceutical Products, Inc., 556 Morris Ave., Summit, epoxy resin plant and laboratories, here, to replace its Kimberton plant. **$344,000.**

N. J., Trenton — MANUFACTURING — Kramer Trenton Co., Olden and Breunig Aves., manufacturing bldg. **$100,000.**

▲ **South Carolina**—NUCLEAR POWER PLANT—The Carolinas-Virgina Nuclear Power Assocs., Inc., (Virginia Elec. & Power Co., 7th and Franklin, Richmond, Va., Duke Power Co., 430 S. Church St., Charlotte, N. C., South Carolina Electric & Gas Co., 1309 Hampton St., Columbia, S. C., and Carolina Power & Light Co., 419 Fayetteville, Raleigh, N. C.) nuclear power plant at Parr shoals on Broad River. **$17,000,000.** Stone & Webster Eng. Co., 49 Federal St., Boston, Mass., consult. engrs. Westinghouse Electric Co., 3 Gateway Center, Pittsburgh, Pa., will develop and furnish plant equipment. Nuclear Eng. Corp., Dunedin, Fla., is consultant.

Tex., Denison — MANUFACTURING PLANT — Builders Products Company, reconstr. mfg. plant. **$200,000.**

Tex., El Paso—PARKING GARAGE—Hotel Pase Del Norte, S. El Paso and W. San Antonio, plans by Benner, Bynum & Dinsmoor, consult. engrs.-archts., 310 El Paso National Bank Bldg., 220x224 ft., masonry, concrete frame parking garage. **$250,000.**

▲ **Tex., Houston**—PLANT EXPANSION—Continental Emsco Co., (div. Youngstown Sheet & Tube Co.), Garden Villas, Mykawa Rd., plans by Golemon & Rolfe, 5100 Travis St., plant expansion. **$3,750,000.** Walter P. Moore, 2 Pinedale, consult. engr. CD 11/12.

Tex., Levelland—PLANT—Cities Service Oil Co., 1707 E 6 St., Tulsa, Okla., gasoline plant imprvs., near here. **$500,000.**

Tex., Navasota—STORAGE, etc.—Texas State Hy. Dpt., Austin, laboratory and storage, **$100,000.** Eng. Office at Austin and c/o Dist. Eng., Bryan, engrs.

Tex., Rosenberg—GRAIN ELEVATOR—W. L. Ansel, Richmond, all metal and concrete type grain elevator. **$125,000.**

▲ **Utah, Salt Lake City**—GARAGE—Auerbach Co., State and Broadway, plans by Ashley T. Carpenter, archt., and Richard B. Stringham, assoc. archt., 203 Crandall Bldg., 7 story, 14 levels, 500 car parking garage. **$1,000,000.** Bids about Dec. 15 (invitational). CD 5/23.

▲ **Man., Portage La Prairie**—FACTORY, etc.—Campbell Soup Co. Ltd., 60 Bermingham Rd., New Toronto, Ont., plans by Green, Blankstein, Russell & Assocs., 222 Osborne St. N., Winnipeg, Man., factory, warehouse and office bldg., 385-acre site northeast section of city. **$5,000,000.** CD 7/26/56, under Man.

Ont., Brampton—PLANT—Dixie Cup Co. (Canada) Ltd. Queen St. W., plans by N. A. Armstrong, 67 Yonge St., Toronto, 1 story, 40x120 ft. office area, 120x320 ft. plant area, poured concrete fdn., steel frame with some masonry, load bearing piers in office area, brick faced exterior walls with some block back up. **$350,000.**

Ont., Guelph—PLANT—General Controls Co. (Canadian) Ltd., 153 Surrey St. E., constr. 50,000 sq. ft. plant. **$350,000.**

Que., Montreal—WAREHOUSE—T. Eaton Co. Ltd., 677 St. Catherine St. W., warehouse, Hodge St. Over **$350,000.**

UNCLASSIFIED

Calif., Mountain View—CORPORATION YARD—City, City Hall, bond election Jan. 14, corporation yard. **$135,000.**

Calif., Mountain View—PARKS, etc.—City, City Hall, bond election Jan. 14, parks and new community center. **$675,000.**

Conn., Bridgeport—REFRESHMENT, etc.—City, City Hall, refreshment and comfort station, East End of Seaside Park, **$100,000.** CD 10/19/45.

Conn., Meriden—RECREATION AREA—City, City Hall, Gale Terrace Recreation area, baseball diamond, tennis courts, 2 club houses and locker rooms, **$100,000.**

Conn., Stratford—FIRE ALARM SYSTEM—Town, Town Hall, fire alarm system, Townwide, **$163,500.**

Fla., Hialeah—RECREATIONAL FACILITIES—City, City Hall, defeated bonds Nov. 12, recreational facilities. **$750,000.** CD 10/30.

Minn., Chatfield—SWIMMING POOL—Bd. Educ., E. S. Gordon, clk., defeated **$100,000** bonds Oct. 25, swimming pool. (Correction-status). CD 11/4.

Mo., Gladstone—SWIMMING POOL—Old Pike Country Club, Gladstone, plans by Folger & Pearson, 1009 Baltimore St., Kansas City, Mo., swimming pool, **$225,000.** Bids probably out in January.

Mo., Kansas City—MEMORIAL FOUNTAIN—City Park Bd., City Hall, Memorial Fountain for the late J. C. Nichols, 47th St., between J. C. Nichols Parkway and Main St. **$125,000.** CD 8/6/54.

▲ **Mo., St. Louis**—MAUSOLEUM—Archdiocesan Bldg. Comn., Rev. James R. Hartnett, exec. secy., 3810 Lindell Blvd., Zone 8, 2 story, 67 x 200 ft., stone granite, concrete, etc. mausoleum addn. in Calvary Cemetery. **$1,000,000.**

N. J., Elizabeth—SWIMMING POOL, etc.—City, City Hall, combination swimming pool and skating rink. **$350,000.**

▲ **N. J., Elizabeth**—PARK—Union County Park Comn., Court house, county park along Elizabeth River from Garden State Parkway to Ursino Lake. **$1,750,000.**

O., Reading—SWIMMING POOL—City, Market St., defeated **$150,000** bonds Nov. 5, swimming pool, wading pool, appurtenances. CD 8/14.

Pa., Lansdowne—SWIMMING POOL, etc.—Lansdowne Pa. Swim Club, 5 Mansfield Rd., plans by Leopold Hauf, Jr., 101 Walsh Rd., swimming pool, bathhouse, filter sys. and parking area. **$140,000.**

▲ **Texas**—OIL LINE, etc.—Humble Oil & Refining Co., 1216 Main St., Houston, 90 mi. 16-in. crude oil line, Hawley Station in Jones Co. to Comyn Station in Comanche Co., **$3,250,000;** buying right of way now, wants to start work by Feb. 1958; electrifying Hawley pumping station, Hawley, Jones Co., **$115,000;** injection station, Clyde, Callahan Co. **$100,000.**

Tex., Lewisville—PARK—City, Tom Beasley, mayor, City Hall, development of Oak Ridge and Eagle Point landing parks on Garze-Little Elm Reservoir. **$200,000.**

▲ **Wash., Tacoma**—WATERWAYS—Port of Tacoma, Portacom Rd., extend Hylebos and Port Industrial Waterways. **$12,000,000.** Work may start next year. CD 11/9/56.

† **Wash., Walla Wala**—ELECTRICAL DISTR. SYS.—Veterans Admin., Pentagon, Wash., D. C., underground electrical distr. sys. at hospital, Proj. 11-4027, **$350,000.** Bids in February. CD 3/28/55, under Public Bldgs.

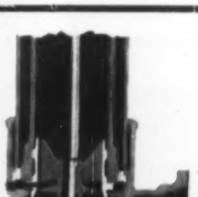
▲ **N. B., Moncton**—CLASSIFICATION YARD—Canadian National, Atlantic Region, D. W. Blair, regional chf. engr., Moncton, Hump Retarder Classification Yard, 810 acres and 65 mi. track, yard will be fitted with electronic equipment for car control, incl. plants for servicing and repairing freight cars, etc. **$17,000,000.**

Ont., Lindsay—GRANDSTAND, etc.—Lindsay Central Exhibition, Newton G. Wilson, secy. mgr., plans by T. A. Wilson Lumber Co., Cannington, grandstand, coliseum and auditorium. **$200,000.**

HYDRANTS...

community protection
by design

If you sat down and checked off the features that a well-designed hydrant ought to possess, you would find yourself describing a Mathews Modernized Hydrant



● The main compression-type valve opens *against* water pressure. The higher the pressure, the tighter the valve—a positively leakproof construction.

● **OTHER QUALITY FEATURES**

The operating thread cannot be bent. Head revolves 360°. Nozzle sections can easily be changed. Nozzle level can be raised or lowered without excavation. Bell, mechanical-joint or flange-type pipe connections.

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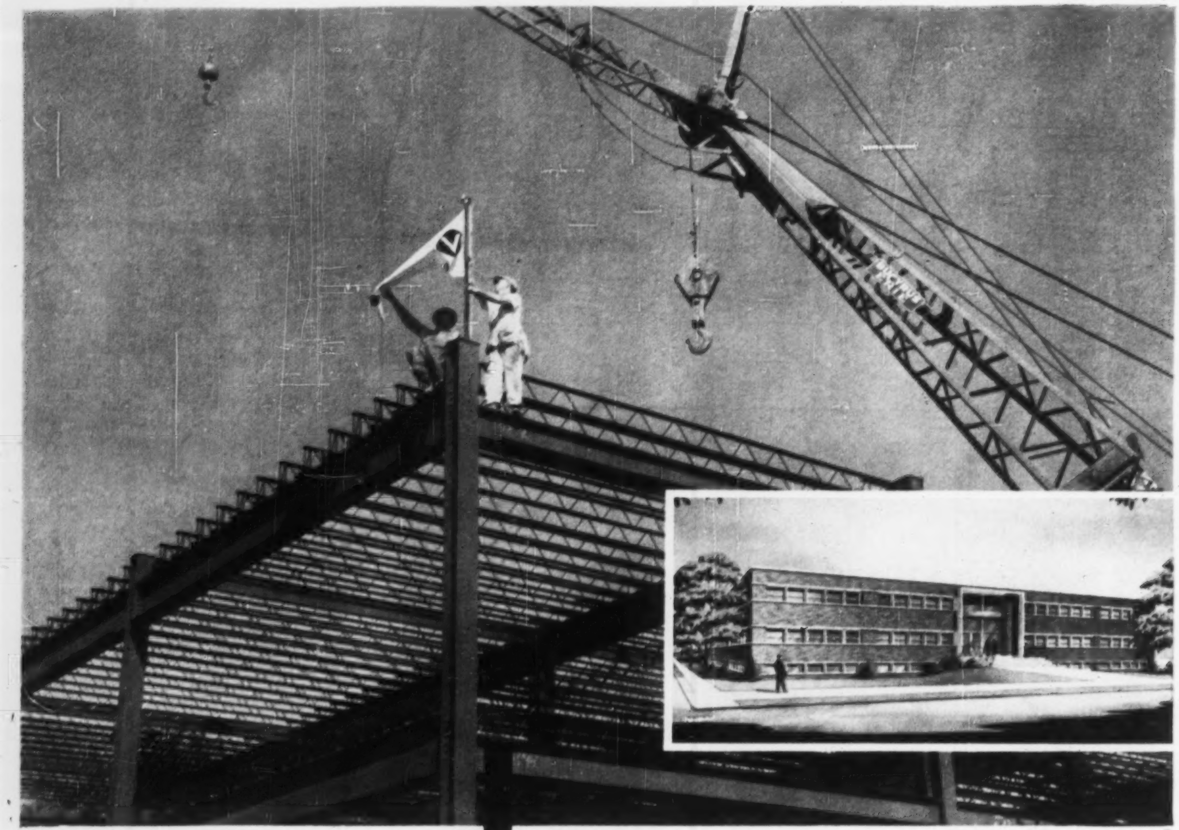
Manufacturers of Mathews Hydrants and "Sand-Spun" Pipe (centrifugally cast in sand molds)



LIGHTWEIGHT PRE-DIMENSIONED LACLEDE STEEL JOISTS SPEED CONSTRUCTION

Owner: ST. LOUIS SHIPBUILDING & STEEL COMPANY
General Contractor: Vollmar Bros. Construction Company
St. Louis, Missouri

Hoisting of contractor's jack marks pre-schedule completion of steel work

Set for completion early in 1958, this new office building for St. Louis Shipbuilding and Steel Company is ahead of construction schedule.

Strengthened by Laclede open web steel joists, this two-story steel framed building was erected quickly because shop fabricated joists, dimensioned to close tolerances, eliminated costly and time-consuming field fitting. Identified at the plant for proper location in this steel framed structure, these Laclede joists were delivered to the site ready for immediate placement.

The open web construction of Laclede steel joists insures strength, minimizes dead weight and makes them easy to handle and place. Laclede Steel Joists are designed and manufactured in strict conformity to the sound engineering standards adopted and approved by the Steel Joist Institute.

OTHER LACLEDE CONSTRUCTION STEELS ARE

STEEL JOIST INSTITUTE
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- **multi-rib reinforcing bars**
- **welded wire fabric**
- **form and tie wire**
- **spirals**
- **corrugated steel centering**
- **electrical weld gas tubing**
- **conduit**
- **steel pipe**

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Bids—Low Bids—Contracts—Second Section

NEW ENGLAND

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

December 10 Massachusetts December 16 Connecticut

STREETS AND ROADS

December 10 Massachusetts December 16 Connecticut

BUILDINGS—BA

Mass., Springfield—SCHOOL—BA 12/18—City, P. Bldgs. Dpt., City Hall, Parker Millbrook Elementary School, Parker St. $865,000. Plans deposit $50, refundable. Donald S. Gilman, 1618 Main St., archt. CD 6/13/56.

▲ **Conn., Waterbury**—BA 12/19—HOUSING—Waterbury Housing Auth., 156 Harris Circle, 150 unit moderate rental housing. $2,000,000. Louis R. Fucito, 37 Hillside Ave., archt. Americo Nemicco̊lo, Glen St., Marlboro, Mass., engr. CD 6/20.

Mass., Malden—SCHOOL—BA 12/19—City, School Bldg. Comn., Mayor Fred J. Lamson, chn., Mayor's Office, City Hall, Daniels Elementary School addn., Daniels St. $425,000. Plans deposit $100, refundable. Edmund I. Leeds & Assoc., Inc., 153 Brighton Ave., Allston, archt. Goldberg, LeMessurier Assoc., 739 Boylston St., Boston, structural engrs. CD 12/8/54.

▲ **Conn., Dayville**—SCHOOL—BA 1/8—State P. Wks. Dpt., 165 Capitol Ave., Hartford, Proj. BI-R-147, Howard H. Ellis Regional Technical School. $2,500,000. Plans deposit $40. CD 10/31.

BUILDINGS—SLC

Conn., Westport—SYNAGOGUE, etc.—Temple Israel, 63 Main St., soon lets contract synagogue and school, Coleytown Rd. $400,000. Percival Goodman, 1860 Broadway, New York, N. Y., archt. CD 5/21.

HEAVY CONSTRUCTION—LB & CA

NEW HAMPSHIRE—Dpt. P. Wks. & Hys., Concord, **Roy C. Abbot**, Lyme, N. H. CA **$510,248**, hot asph. roadway, 2.602 mi. NH 10, Hanover. Bids Oct. 24, awarded Nov. 18. CD 10/29, under LB.

† **Arundel Corp.**, Pier No. 2, Pratt St., Baltimore, Md., CA **$774,111** imprvt. dredging and rock removal Mystic River, Boslon, CIVENG-019-016-58-2, MASSACHUSETTS. U. S. Eng., 150 Causeway St., Boston, Mass. Bids Nov. 13. CD 11/20, under LB.

† **Quintin Vespa Co., Inc.**, 6 Great Meadow Rd., Newton, Mass., LB **$224,422**, est. $220,000, sewage treatment plant and sewers installed in streets, etc., BILLERICA, MASS. Federal Housing Admin., Dpt. Housing & Home Financing Agency, Procurement & Property, 333-3rd St. N. W., Wash. 25, D. C. Emmons & Fleming, 1 North St., Reading, Mass., engrs.

BUILDINGS—LB & CA

Mozzicato Constr. Co., 168 Mystic Ave., Medford, Mass., LB **$681,133**, est. $700,000, 3 story DORMITORY addn., BOSTON, MASS. Emanuel College, 400 Fenway St., Boston, Mass. Bids Nov. 13. CD 11/6.

J. & A. Stivaletta, 505 High St., Dedham, Mass., Owner Builds. Approx. **$345,000**, RESIDENTIAL DEVELOPMENT, 14 houses, Endicott Section-Thompson St., DEDHAM, MASS.

Felsmere Realty Co., 861 Highland Ave., Medford, Mass., Owner Builds. **$460,000**, RESIDENTIAL DEVELOPMENT, 22 houses, Highland Ave., MEDFORD, MASS.

Leo McManus Constr. Co., Shelter Rock Rd., Danbury, Conn., CA **$400,000**. SUPERMARKET for First National Stores, BETHEL, CONN. Tryson Realty Co., 170 White S. Danbury, Conn. Allan H. Pokras, 79 Oakview Circle, Bridgeport, Conn., archt. Awarded Nov. 21.

E. & F. Constr. Co., 94 Wells St., Bridgeport, Conn., CA **$400,000**. CHURCH, 834 Brookside Dr., FAIRFIELD, CONN. St. Pius X Parish, Brookside Dr., Fairfield, Conn. Bids Oct. 29, awarded Nov. 21. CD 10/17.

W. J. Megin, Inc., 51 Elm St., Naugatuck, Conn., CA **$317,713**, 50,000 sq. ft. steel frame, WAREHOUSE, 350 ft. railroad siding, Canal St., SHELTON, CONN. B. F. Goodrich Co., 500 S. Main St., Akron, O. Awarded 11/20. CD 11/26, under LB.

▲ **H. Wales Lines Co.**, 134 State St., Meriden, Conn., CA Approx. **$1,500,000**. CHEMICAL PRODUCTION PLANT LABORATORY and OFFICE, WALLINGFORD, CONN. American Cyanamid Co., 30 Rockefeller Plaza, New York, N. Y. Bids Nov. 6, awarded Nov. 17. CD 10/31.

MIDDLE ATLANTIC

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

December 11 Delaware

STREETS AND ROADS

December 11 Delaware December 20 Pennsylvania

New York—PARK EXPANSION, etc.—BA 12/17—Long Island State Park Comn., Administrative Headquarters, Belmont Lake State Park, Babylon, continuation of expansion, Contr. S.M.P. 57-2, grading, landscaping and misc. work, Sunken Meadow State Park, Kings Park, Suffolk Co.

† **Pennsylvania—BA 1/7—U. S. Eng., 2635 Abbotsford** Ave., Phila., relocation 3.3 mi. roadway, Dyberry Reservoir. $500,000-$1,000,000 **CD 9/11.**

† **N. J., Wrightstown**—HOUSING—BA On Or About **1/16**—Base Procurement Office, McGuire Air Force Base, Wrightstown, armed services housing consisting of 300 family housing units at McGuire Air Force Base. Plans deposit $100. CD 9/2/55.

BUILDINGS—BA

Pa., Newtown Square—SCHOOL—BA 12/12—Baader, Young & Schultze, archts., 150 Walnut St., Phila., elementary school, Goshen Rd., for Newtown Twp. School Dist. $509,900. Plans deposit $25. Chester I. Duncan, 225 S. 15th St., Phila., engrs. CD 11/20.

▲ **D. C., Wash.**—SCHOOL—BA 12/19—D. C. Govt., Director Bldgs. & Grounds, 499 Pa. Ave. N.W., elementary school, vicinity of 6th and Chesapeake Sts. S.E., to be known as Florance Hendley School. Plans deposit $50. Murphy & Locraft, 1518 P St. N.W., archts. CD 9/19/56.

▲ **N. Y., Rockaway Beach**—HOSPITAL—BA 12/20—Rockaway Beach Hospital, Beach 85 St., 5 story hospital at Beach 51 St. and Rockaway Beach Blvd. $2,700,000. Gloster & Gloster, 253 Sunrise Hy., Rockville Center, archts. CD 3/1/56.

Pa., Polk—STOKERS, etc.—BA 1/8—General State Auth., 18 and Herr Sts., Harrisburg, replacement of stokers and forced draft sys. at Polk State School. $400,000. Plans deposit $10. Swindell-Dressler Corp., Box 1888, Pittsburgh, engrs. CD 3/1/56.

HEAVY CONSTRUCTION—LB & CA

Lizza & Sons, Inc., 21 Oyster St., Oyster Bay, N. Y. LB **$271,491**, (11 bidders) widening Indian Head Rd. for Jericho Turnpike north for 1¾ mi., Commack, RIVERHEAD, N. Y. Suffolk Co. Supt. P. Wks., Court House, Riverhead, N. Y. Bids Nov. 21. CD 11/14.

Thalle Constr. Co., 365 Tuckahoe Rd., Yonkers, N. Y. LB **$702,435** (5 bidders), Contr. 900, constr. connecting sewer, Section IV, Yonkers Joint Sewer Project, city of Yonkers, WHITE PLAINS, N. Y. Comr. P. Wks. Westchester Co., County Office Bldg., White Plains, N. Y. Bids Nov. 20. CD 11/13.

Remsco Assocs., 280 Hobart St., Perth Amboy, N. J., LB **$298,000**, Naval Air Station, Turbine Test Station, detonation sys. NBy 11558, TRENTON, N. J. Dpt. of Navy, Phila. Naval Base, Phila., Pa. CD 1/15/54.

BUILDINGS—LB & CA

Mars Associates & Normel Constr. Co., 271 Church St., New York 13, N. Y. LB **$586,000** (5 bidders) general contract, PUBLIC SCHOOL 148 modernization and conversion, north side of Ellery St. between Delmonico Pl. and Throop Ave., BROOKLYN, N. Y. Bd. Educ., Bureau Constr. 42-15 Crescent St., Long Island City, N. Y. Bids Nov. 19. CD 10/15.

Country Way Community, c/o Herman H. York, archt., 90-04 161 St., Jamaica, N. Y., Owner Builds, **$660,000**. 20 HOMES, Rockaway Ave. between Garden City High School and Garden City Golf Course, GARDEN CITY, N. Y.

▲ **Thomas Caruso**, c/o Lane Realty, 107-40 Queens Blvd., Forest Hills, N. Y., Owner Builds, CA **$1,000,000**, 58 HOUSES, 221 St. and Laconia Ave., NEW YORK, N. Y.

▲ **Doral Constr. Corp.**, 12 E. 48th St., Zone 17, Owner Builds, **$4,000,000**, 20 story APARTMENT, 180-194 E. End Ave. from 88 to 89 Sts., NEW YORK, N. Y. Sylvan & Robert Bien, 33 W. 46 St., New York 19, N. Y., archts. CD 2/6.

▲ **John Kennedy & Co., Inc.**, 205 E. 42 St., New York 7, N. Y. CA **$3,128,800**, STUDENT FACULTY CENTER, on campus, NEW YORK, N. Y. Fordham University, Fordham Rd., New York, N. Y. Bids Oct. 31. CD 10/28.

▲ **Lasker & Goodman Corp.**, 50 E. 42nd St., New York, Zone 17, LB **$6,921,000**, FERRIS BOOTH HALL, CITIZENSHIP CENTER and UNDERGRADUATE DORMITORY, NEW YORK, N. Y. Columbia University, 116 St. and Broadway, New York, N. Y. CD1/17.

Mars Associates & Normel Contg. Co., 271 Church St., New York 13, N. Y. LB **$485,000** (9 bidders) general contract, PUBLIC SCHOOL No. 3, South Goff Ave., Lafayette St., Cordelia Ave. and Everett Pl., Pleasant Plains, Richmond Boro, PRINCE BAY, N. Y. Bd. Educ. Bureau Constr., 42-15 Crescent St., Long Island City, N. Y. Bids Nov. 26. CD 11/8.

† **Siegfried Constr. Co., Inc.**, 6 North Pearl St., Buffalo, N. Y. CA **$506,020**. U. S. ARMY RESERVE TRAINING CENTER, TONAWANDA, N. Y. U. S. Eng., 111 E. 16 St., New York 3, N. Y. CD 7/1, under LB.

Panna Constr. Co., Somerdale, N. J. LB **$430,000**, general contract ELEMENTARY SCHOOL, Woodlawn Ave., BARRINGTON, N. J. Bd. Educ., Barrington, N. J. Bids Nov. 19. CD 11/11.

▲ **Joseph Krantz**, 1211 Sterling St., Phila., Pa. Separate Contracts. **$1,512,000**, 108 unit RESIDENTIAL DEVELOPMENT Route 38 and Laurel Rd., HAINESPORT, N. J.

Great Hills Homes, c/o Walter C. Pfeiffer, archt., 322 Morris Ave., Elizabeth, N. J., Owner Builds, **$650,000**, 20 HOMES at junction of Great Hills and White Oak Ridge Rds., SHORT HILLS, N. J.

▲ **Ritter Bros.**, 1501 N. Cameron St., Harrisburg, Pa., CA **$1,000,000**, 2 story, 55,000 sq. ft. floor space brick OFFICE BLDG. and 300 car parking area CAMP HILL, PA. Blue Shield, Front and Radnor Sts., Harrisburg, Pa., archts. CD 8/15/56.

H. O. MacColloch, 104 Keswick Ave., Willow Grove, Pa., Separate Contracts. **$350,000** RESIDENTIAL DEVELOPMENT, Edgecombe Ave., etc., GLENSIDE, PA.

Suburban Greens Inc., 104 S. York Rd., Hatboro, Pa., Separate Contracts. **$450,000**, RESIDENTIAL DEVELOPMENT (26) Valley Rd., HUNTINGDON VALLEY, PA.

R. W. Fairbrother, 2121 Silverside Rd., Wilmington, Del., Separate Contracts. **$344,000** RESIDENTIAL DEVELOPMENT, Cedarcroft Development, KENNETT SQUARE, PA.

▲ **Wark & Co.**, 1920 Sansom St., Phila., Pa. CA **$1,169,000**, JUNIOR HIGH SCHOOL, North Wales Rd., LANSDALE, PA. North Penn Joint School Auth., Lansdale, Pa. Bids Oct. 17, awarded Nov. 19. CD 10/24, under LB.

Joseph J. Leite, 1005 Swarthmore Ave., Folsom, Pa., Separate Contracts. **$350,000** RESIDENTIAL DEVELOPMENT, Bowling Green Section, MEDIA, PA. Jack Swerman, 405 Market St., Chester, Pa., archt.

Leon Crane, Newtown Square, Pa. Separate Contracts. **$344,000**, RESIDENTIAL DEVELOPMENT, Ferguson Ave., etc., NEWTOWN SQUARE, PA.

Graziano Constr. Co., 7321 Frankstown Ave., Pittsburgh 8, Pa., LB **$973,900** general constr. 6 level L-Shaped rein.-con. PARKING GARAGE, PITTSBURGH, PA. Pittsburgh P. Parking Auth., 200 Ross St., Pittsburgh, Pa. Bids Nov. 7. CD 10/17.

▲ **Cogswell Constr. Co.**, 513 Park Ave., Baltimore 1, Md. CA **$2,897,000**, brick, concrete, steel, block Severna Park Junior-Senior HIGH SCHOOL, Severna Park, ANNAPOLIS, MD. Anne Arundel Co. Bd. Educ., Annapolis, Md. Bids Nov. 5. CD 11/13, under LB.

Fishman Constr. Co., 123 N. Van Buren St., Rockville, Md. and **Coastal Contracting & Engineering Co.**, 1129 Vermont Ave. N. W., Wash., D. C., (joint venture) LB **$637,845** (6 bidders), 65 unit-HOUSING, Westmore Ave., ROCKVILLE, MD. Housing Authority of Rockville, 120 S. Washington St., Rockville, Md. Bids Nov. 21. CD 10/29.

Coleman & Wood, Inc., 963 Selim Rd., Silver Spring, Md. LB **$432,539** (6 bidders), Western JUNIOR HIGH SCHOOL addn., Bethesda, ROCKVILLE, MD. Montgomery Co. Bd. Educ., Rockville, Md. Bids Nov. 21. CD 11/20.

▲ **Jos. F. Hughes & Co.**, S. E. Franklin St., Baltimore 2, Md., LB **$1,956,417** (12 bidders), 42-classroom, brick, concrete, steel, block Middle River JUNIOR HIGH SCHOOL, Middle River, TOWSON, MD. Baltimore Co. Bd. Educ., Aigburth Rd., Towson 4, Md. Bids Nov. 19. CD 11/11.

Clute Brothers, Wyoming, Del. LB **$382,525** (3 bidders), Booker T. Washington SCHOOL addns., DOVER, DEL. Dover Special School Dist., Dover, Del. Bids Nov. 20. CD 10/30.

R. W. Fairbrother, 2121 Silverside Ave., Wilmington, Del., Separate Contracts. **$680,000**, RESIDENTIAL DEVELOPMENT, Mill Creek Hundred, WILMINGTON, DEL.

Security Builders, 2501 Limestone Rd., Wilmington, Del., Separate Contracts, **$350,000** RESIDENTIAL DEVELOPMENT, Mill Creek Hundred, WILMINGTON, DEL.

SOUTH

BUILDINGS—BA

Ala., Birmingham—SCHOOL—BA 12/12—Bd. Educ., 2015 7th Ave. N., Northern High School for Negroes. $500,000. Plans deposit $25. Extended date. Charles McCauley, Jackson Bldg., archts. CD 10/7.

Ala., Warrior—HOUSING—BA 12/12—Rural Housing Auth. of Jefferson Co., Warrior, 38 low rent housing units. $380,000. Plans deposit $50. Charles McCauley, Jackson Bldg., Birmingham, archt. CD 4/1/52.

Ky., Louisville—OFFICE—BA 12/17—Blue Cross Hospital Plan, Inc., 231 W. Main St., 2 story, (irregular shaped) 155 x 203 ft., brick, stone, rein.-concrete office bldg., Watterson Expressway and Bardstown Rd., Approx. $400,000. Fred Elswick & Assoc., 132 St. Matthews Ave., St. Matthews, archts. E. R. Ronald & Assoc., 554 S. 3rd St., engrs. CD 7/25.

HEAVY CONSTRUCTION—LB & CA

▲ **Howard Constr. Co.**, 2881 Immanuel Rd., Greensboro, N. C., CA **$1,169,950**, sanitary sewer imprvs., WINSTON-SALEM, N. C. City, City Hall, Winston-Salem, N. C. Bids Sept. 27. CD 10/15, under LB.

▲ **GEORGIA**—State Hy. Dpt., General Office No. 2, Capitol Sq., Atlanta,

Ga.—**R. G. Foster & Co.**, Drawer 8, Wadley, Ga., CA **$1,593,625**, wid'n., reconstr., resurf. and reconstr. 1 bridge 27.407 mi. on what is locally known as Swainsboro-Lyons Rd., State Rte. 4, U.S. Rte. 1, F.-403-1 (10), Emanuel and Toombs Counties;

Ga.—**W. L. Cobb Constr. Co.**, 3488 E. Ponce de Leon Ave., Atlanta, Ga. CA **$568,388**, grading, paving 13.121 mi. on what is locally known as Monticello-Porterdale Rd., State Rte. 062, Fed. Aid Sec. Proj. S-1242 (1), Jasper and Newton Counties. Bids Oct. 18, awarded Oct. 22. CD 10/23, under LB.

MacDougald Constr. Co., Northside Dr., Atlanta, Ga., LB **$430,870**. grading and site preparation for Lenox Square Shopping Center, ATLANTA, GA. Lenox Square, Inc., Glenn Bldg., Atlanta, Ga. Toombs, Amisano & Wells, 70 Fairlie St. N.W., Atlanta, Ga., archts.

▲ **Pecon Corp.**, 167 Almeria Ave., Coral Gables, Fla., and **John C. Peterson Constr. Corp.**, 958 Church St., Baldwin, N. Y., LB **$2,404,363**, grading, paving, utilities, Miami International Airport, MIAMI, FLA. Bd. Comrs. Dade Co., Court House, Miami, Fla. Howard, Needles, Tammen & Bergendoff, Bldg. 1424, Ave. E-20 St., Miami, Fla., engrs.

Paul Smith Contr. Co., 310 N. Rome Ave., Tampa, Fla., CA **$782,263**, approach embankments and retaining walls, concrete-steel or concrete approach spans and bascule span for bridge across Hillsborough River at Krause St., TAMPA, FLA. City, N. Nuccio, mayor and Bd. Representatives, City Hall, Tampa, Fla. Bids Oct. 31. CD 10/10.

Traylor Bros., Inc., Sta. B, Box 66, Evansville, Ind., CA **$969,315**, Contract No. 226-E, Ohio River Interceptor Sewer, Section E, involving 4,200 ft. 8 in. sewer, 1,000 ft. tunneling, LOUISVILLE, KY. Metropolitan Sewer Dist., 412 W. Market St., Louisville, Ky. Bids Nov. 14, awarded 11/26. CD 11/19, under LB.

BUILDINGS—LB & CA

Sharpe & Hamaker, 3248 Wilson Blvd., Arlington, Va., LB **$526,154** (11 bidders) BANK BLDG., Glebe Rd. and Wilson Blvd., ARLINGTON, VA. First National Bank of Arlington, 249 N. Glebe Rd., Arlington, Va. Bids Nov. 21. CD 10/30.

Earl Rosti, 119 Mary St., Falls Church, Va., LB **$368,206** (10 bidders) 20 room ELEMENTARY SCHOOL, Langley Forest, FAIRFAX, VA. Fairfax Bd. Educ., Fairfax, Va. Bids Nov. 21. CD 10/21.

Barge & Co., 250 Piedmont Ave. N.E., Atlanta, Ga., LB **$416,000**. DORMITORY for Men, ATLANTA, GA. Clark College, 240 Chestnut St. S.W., Atlanta, Ga. Bids Nov. 7. CD 10/24.

R. A. Hollingsworth & Son, Carrollton, Ga., LB **$573,374**, North Cobb HIGH SCHOOL, MARIETTA, GA. Cobb Co. Bd. Educ., 117½ Atlanta St., Marietta, Ga. Bothwell & Nash, 208 Roswell St., Marietta, Ga., archts. CD 1/25.

Cooper Constr. Co., Box 5795, Jacksonville, Fla., LB **$417,927**, MEN'S DORMITORIES, Stetson University, DELAND, FLA. Stetson University, Deland, Fla. Bids Nov. 20. CD 10/29.

Sullivan & Cozzart, 822 W. Ky. St., Louisville, Ky., LB **$679,800** (7 bidders) general contract 3 story, no bsmnt., irregular shaped, 158x323 ft., 109x150 ft., concrete, brick, steel frame Fairdale JUNIOR HIGH SCHOOL, LOUISVILLE, KY. Jefferson Co. Bd. Educ., 618 W. Jefferson, Louisville, Ky. Bids Nov. 25. CD 11/12.

MIDDLE WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
BRIDGES
December 11 Michigan
STREETS AND ROADS
December 10, 11 Michigan — December 17 Indiana

BUILDINGS—BA

Wis., **Fort Atkinson**—HOSPITAL ADDN., etc.—BA 12/20—Fort Atkinson Memorial Hospital, Fort Atkinson, hospital addns., alterations. $567,500. CD 11/28/56.

HEAVY CONSTRUCTION—LB & CA

▲ **OHIO**—Dpt. Hys., Columbus, Zone 15,
0—**Maxon Constr. Co.**, 2600 Far Hills Ave., Dayton, O. CA **$4,298,136**. Type T-71 and structure 5.139 mi. SR 1-12.38, 0.00, I-1105 (27) Ashland and Wayne Counties;
0—**Smith Constr. Co. of Ohio**, P.O. Box 515, Vienna, O., CA **$1,208,012**, Parts 1 and 2, Type T-35, 10.151 mi. USR 322-17.82 (0.00-5.17) (5.38-8.01) 19.63, Part No. 1, F-489 (9) and F-489 (8) Part No. 2, Geauga and Ashtabula Counties. Bids Nov. 12. CD 11/21, under LB.

OHIO—Dpt. Hys., Columbus, Zone 15,
rejected bids Nov. 12, Type T-71, 0.111 mi. USR 40-(27.95-28.00) F-610 (17) Belmont Co. LB **$204,288**. CD 11/21, under LB.

▲ **OHIO**—Dpt. Hys., Columbus, Zone 15,
Penker Constr. Co., 1030 Consumer St., Cincinnati, O. LB **$4,882,016**, c. conc. paving, constr. grade separation with the Baltimore & Ohio R.R., consisting of steel structure, Bridge No. HAM-4W-0725; Structure HAM 4-W-0740; Bridge No. HAM 4W-0742; Bridge No. HAM 4-W-0745; Bridge HAM 4W-0775; Bridge No. HAM-562-0031; Bridge No. HAM-562-0031; Bridge No. HAM-562-0070, State Rte. Nos. 4W and 562 City of Cincinnati, City of St. Bernard and Village of Elmwood Place, Hamilton Co. Bids Nov. 26. CD 11/13.

S. A. Ruebel Co., Ross Ave., St. Bernard, O., LB **$485,600** (4 bidders) Duck Creek Interceptor sewer, Red Bank Rd., CINCINNATI, O. Hamilton Co., Cincinnati, O. Geo. Lemmel, Cincinnati, O., co. engr. CD 2/10/54.

L. A. Wells Constr. Co., foot of W. 3 St., Cleveland 3, O., LB **$249,876** (3 bidders) Contr. 7, repairing outfall sewer and stone wall wings sewage treatment plant addn., EUCLID, O. City of Euclid, City Hall, 585 E. 222 St., Cleveland 23, O. Bids Nov. 18. CD 11/11.

▲ **A. Pontarelli & Sons**, 9300 Grand Ave., Franklin Park, Ill., CA **$1,246,040**, Contr. No. 6, Roscoe Sewer, Sec. Lamon Ave., CHICAGO, ILL. City, City Hall, Chicago, Ill. Bids Nov. 11. CD 11/12, under LB.

Shamrock Engineering, 865 S. Lake St., Gary, Ind., LB **$183,786**, sewage treatment plant addn., MUNDELEIN, ILL. Village, Village Hall, Mundelein, Ill. CD 11/14.

Woerfel Corp., 5345 N. Hopkins St., Milwaukee, Wis., LB **$296,285** (15 bidders), general contract, rein.-con. underground reservoir, WEST ALLIS, WIS. City, City Hall, West Allis, Wis. Bids Nov. 18. CD 10/8;
Wm. Faust & Co., 401 N. 63 St., Wauwatosa, Wis., LB **$173,824** (9 bidders), equipment and piping, (West Allis, Wis.);
Dietz Electric Co., 264 E. Ogden Ave., Milwaukee, Wis., LB **$61,870** (10 bidders), electrical work (West Allis, Wis.).

BUILDINGS—LB & CA

John E. Nashlund, Inc., 1717 Section Rd., Cincinnati, O., CA Est. **$350,000**. 1 story, bsmnt., brick, structural steel SYNAGOGUE, Ridge Ave., AMBERLEY VILLAGE, O. Sholom Temple, Ross Ave., Cincinnati, O. Awarded Nov. 21. CD 8/9.

▲ **Conrad Seyferth**, 1458 Anderson Ferry Rd., Cincinnati, O., Own Forces, Approx. **$1,000,000**. 15-store SHOPPING CENTER, Anderson Ferry and Delhi Park, CINCINNATI, O. E. A. Sobolewski, 2340 Laredo St., Cincinnati, O., engr. Leslie Moss, 1210 Drott St., Cincinnati, O., archt. CD 3/7.

R. Hansen Co., 2646 N. Moreland Blvd., Cleveland 20, O. LB **$437,000** general contract 5 story CLEVELAND RECEIVING HOSPITAL addn., for Dpt. Mental Hygiene & Correction, CLEVELAND, O. Dpt. P. Wks., State Dpt. Bldg., Columbus, O. Bids Nov. 20. (**Correction**—name of low bidder). CD 11/22, under LB.

▲ **A. M. Kinney, Inc.**, 60 E. 56th St., New York, N. Y., LB **$1,000,000**. sheet paper PLANT to fabricate paper stock into cartons, MASON, O. International Paper Co., c/o local branch, Dixie Term., Cincinnati, O. CD 7/8.

Fred W. Entenman, Inc., 3323 Secor Rd., Toledo, O., LB **$501,471** (5 bidders) 50-unit HOUSING known as A. Gordon Spieker Terrace, TOLEDO, O. Toledo Metropolitan Housing Auth., 400 Nebraska St., Toledo, O. Bids Nov. 19. CD 10/28.

Purdue University, Executive Bldg., West Lafayette, Ind., rejected bids Oct. 24, FOOD SERVICE BLDG., LAFAYETTE, IND. LB **$685,741**. CD 10/2.

▲ **O. J. Boldt Constr. Co.**, P. O. Box 415, Appleton, Wis., LB Est. **$1,100,000**, general contract MUSIC DRAMA CENTER, APPLETON, WIS. Lawrence College, Appleton, Wis. Bids Nov. 14. CD 10/21.

Kennedy Constr. Co., 405 E. Grand Ave., Beloit, Wis., CA **$461,882**, general contract, WOMEN'S DORMITORY and DINING HALL, BELOIT, WIS. Beloit College, Beloit Wis. Bids Nov. 13. CD 11/6.

Hoeppner-Bartlett Co., 631 E. Madison St., Eau Claire, Wis., LB **$359,450** (6 bidders) general contract, STUDENT UNION BLDG., EAU CLAIRE, WIS. State College Bldg. Corp., Madison, Wis. Bids Nov. 14. CD 10/23.

Wis. Bridge & Iron Co., 5023 N. 35 St., Milwaukee, Wis., CA Est. **$321,000**, 1 story, 199x200 ft. FOUNDRY addn., MILWAUKEE, WIS. Pelton Steel Casting Co., 148 W. Dewey St., Milwaukee, Wis. A. Heuel, c/o contractor, engr.

A. Grignano Co., 802 E. Olin Ave., Madison, Wis., LB **$392,550** (9 bidders), general contract STUDENT UNION BLDG., PLATTEVILLE, WIS. State College Bldg. Corp., Madison, Wis. Bids Nov. 14. CD 10/23.

T. V. John & Son. 13555 Juneau Ave., Elm Grove, Wis., CA Est. **$380,000**. CHURCH addn., WAUWATOSA, WIS., Mt. Zion English Evangelical Lutheran Congregation, 12012 W. North Ave., Wauwatosa, Wis. A. Reddemann & W. Domann, 13395 Watertown Plank Rd., Wauwatosa, Wis., archts.

L. A. Trapp Constr. Co., 334 State St. S.E., Grand Rapids, Mich., CA **$500,000**, PLANT addns. incl. 2 story addn., constr. single unit from 3 existing bldgs., six story exterior stairway and elevator, BATTLE CREEK, MICH. Kellogg Co., (Cereals) Battle Creek, Mich.

▲ **O. W. Burke Co.**, 1032 Fisher Bldg., Detroit, Mich., CA **$11,590,000**, Contract MH-52-C, EXHIBIT BUILDING and PARKING GARAGE, DETROIT, MICH. City, Frank G. Schomanske, pres. Civic Center Comn., City Hall, Detroit, Mich. Bids Nov. 6. CD 11/29, under LB.

▲ **J. A. Fredman, Inc.**, 735 South Paddock, Pontiac, Mich., CA **$1,137,512**, Martha T. Berry HOSPITAL addn., alterations, Elizabeth and Dunham Rds., MOUNT CLEMENS, MICH. Bd. Supervs. Macomb Co., Albert A. Wagner, clk., Mt. Clemens, Mich. Bids Nov. 1. CD 11/13, under LB.

Collins & Catlin, Port Huron, Mich., CA **$749,000**. HIGH SCHOOL, OXFORD, MICH. Bd. Educ., Oxford Area Schools, Gerda Houck, secy., Oxford, Mich. Bids Nov. 6. CD 10/17.

WEST OF MISSISSIPPI

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS
BRIDGES
December 10 Iowa
STREETS AND ROADS
December 10 Iowa

† **Missouri**—BA 12/12—U. S. Eng., 1800 Federal Office Bldg., Kansas City 6, Mo., constr. and repair approx. 11,460 lin. ft. revetment, Lupus to Chamois Reaches, CIVENG-23-028-58-42. $300,000-$350,000. Plans deposit $3. CD 11/25.

▲ **Tex., Midland**—BA 12/18—City, c/o J. M. Orman, mgr., constr. Paul Davis Field water suoply line Contr. A-70,905 lin. ft. 30 in. concrete cylinder pipe. Contr. B-87,215 lin. ft. 30 in. concrete cylinder pipe, 6,000 lin. ft. 12 in. c.i. well collection lines. $2,000,000. Plans deposit $25. CD 9/3.

† **Tex., Harlingen**—USAR BLDG.—BA 12/19—U. S. Eng., Box 1229, Galveston, USAR Bldg. and appurtenances, Harlingen Air Force Base. $200,000-$300,000. CD 3/8/52.

▲† **Oklahoma**—BA 1/15—U. S. Eng., Tulsa, spillway and embankment for Oologah Dam, ENG-34-066-58-26, Rogers Co. $3,000,000. CD 9/5.

† **Ark., Fayetteville**—AIR-CONDITIONING—BA 1/28—Veterans Admin., Munitions Bldg., Wash., D. C., air-conditioning operating suite at Veterans Hospital. $100,000-$150,000.

▲ **Texas**—OIL PIPE LINE—Bids Asked—Sinclair Pipeline Co., c/o Petroleum Bldg., Houston (selected list of bidders) 150 mi. 20 in. crude line from Teague to Houston. $4,500,000. CD 11/16/55.

BUILDINGS—BA

Tex., Houston—SCHOOLS—BA 12/12—Houston Ind. School Dist., 1300 Capitol St., 3 elementary school addns., incl. Julius N. Dodson, Foster Place and Will Rogers. $485,000. Plans deposit $50. Matkin & Fitch, 4101 San Jacinto St., archt. and Harvin C. Moors, 2006 W. Alabama St., co-ord. archt. Jas. H. Howard & Assocs., 2728 Wesleyan St., and Matkin & Fitch, 4101 San Jacinto St., engrs. CD 11/22/54.

Tex., Denton—HOSPITAL—BA 12/17—Flow Memorial Hospital, (Denton County, owners) T. M. Barnes chn., Bd. Trustees, 60 bed hospital addn. $800,000. Plans deposit $50. Extended date. Page, Southerland & Page, 602 West Ave., Austin, archts. CD 10/2.

▲ **Tex., Kountze**—COURTHOUSE ANNEX—BA 12/18—Hardin County, c/o Courthouse, constr. courthouse annex. $1,578,601. Extended date. Dickson, Dickson & Assocs., 2205 Orange St., Beaumont, archts. CD 11/26.

† **Kan., Fort Riley** — BARRACKS, etc. — BA 12/19 — U. S. Eng., 1800 Federal Office Bldg., Kansas City 6, Mo., EM barracks and utilities, ENG-23-028-58-10. $400,000-$450,000. Plans deposit $6. CD 11/21.

▲ **Minn., St. Paul**—APARTMENTS—BA 12/20—National Redevelopment Corp., 1207 N.B.C. Bldg., Cleveland, O. (selected list of bidders) 14 two-story apartments in area bounded by Rondo Ave., Fuller Ave., Farrington and Marion Sts. $1,000,000. CD 11/11.

Tex., Fort Worth—SCHOOL—BA 1/7—Fort Worth Pub. Schools, Ed. P. Williams, bus. mgr., 3210 W. Lancaster St., 1 story, brick, tile Kirkpatrick Elementary School, 3200 Refugio St. $550,000. Plans deposit $50. John W. Floore, 1401 W. Lancaster St., archt. CD 2/4.

HEAVY CONSTRUCTION—LB & CA

Rinderknacht Constr. Co., 113 F Ave. N. W., Cedar Rapids, Iowa. CA **$542,920**, sewage treatment plant, OTTUMWA, IOWA. City, City Hall, Ottumwa, Iowa. Bids Oct. 22. CD 11/11, under LB.

▲ **R. H. Fulton & Co.**, Lubbock, Tex. CA Est. **$1,620,000** 81 mi. 18 in. and 13 mi. 20 in. gas lines from near Pampa to near Dumas, Tex., Gray Co., TEXAS. El Paso Natural Gas Co., El Paso Natural Gas Bldg., El Paso, Tex. CD 2/31/56.

Bill Cadenhead, 7201 Pipeline Rd., Fort Worth, Tex. LB **$301,728** (Base Bid) Berry St. Incinerator addn., FORT WORTH, TEX. City, c/o Thos. A. McCann, mayor, City Hall, Fort Worth, Tex. Bids Nov. 19. CD 10/29.

† **Crompton Parkinson, Ltd.**, Hayes, Middlesex, England, LB **$206,403** (13 bidders) six 7,750/9,687-kva. power transformers for Fremont Canyon power plant, Glendo unit, Missouri River Basin, DS-4973, WYOMING, Bureau Reclamation, Dpt. Interior, Denver Federal Center, Denver, Colo. Bids Nov. 21. CD 10/2.

COLORADO—State Hy. Dpt., 4201 E. Arkansas St., Denver,
Gardner Constr. Co., Glenwood Springs, Colo., CA **$239,600** est. $244,000. grading, structures 2.654 mi. State Hy. 131, Colo. Proj. S-0121 (13), McCoy, Routt and Eagle Counties. Bids Nov. 19. CD 11/14.

▲ **Mullinix Constr. Co.**, 1405 N. W. 5 St., Oklahoma City, Okla., CA Est. **$1,500,000**, 70 mi. 115,000 volt electric line from Albuquerque to Ambrosia Lake, ALBUQUERQUE, N. M. Kerr McGee Co., Kerr McGee Bldg., Oklahoma City, Okla. Awarded Nov. 20.

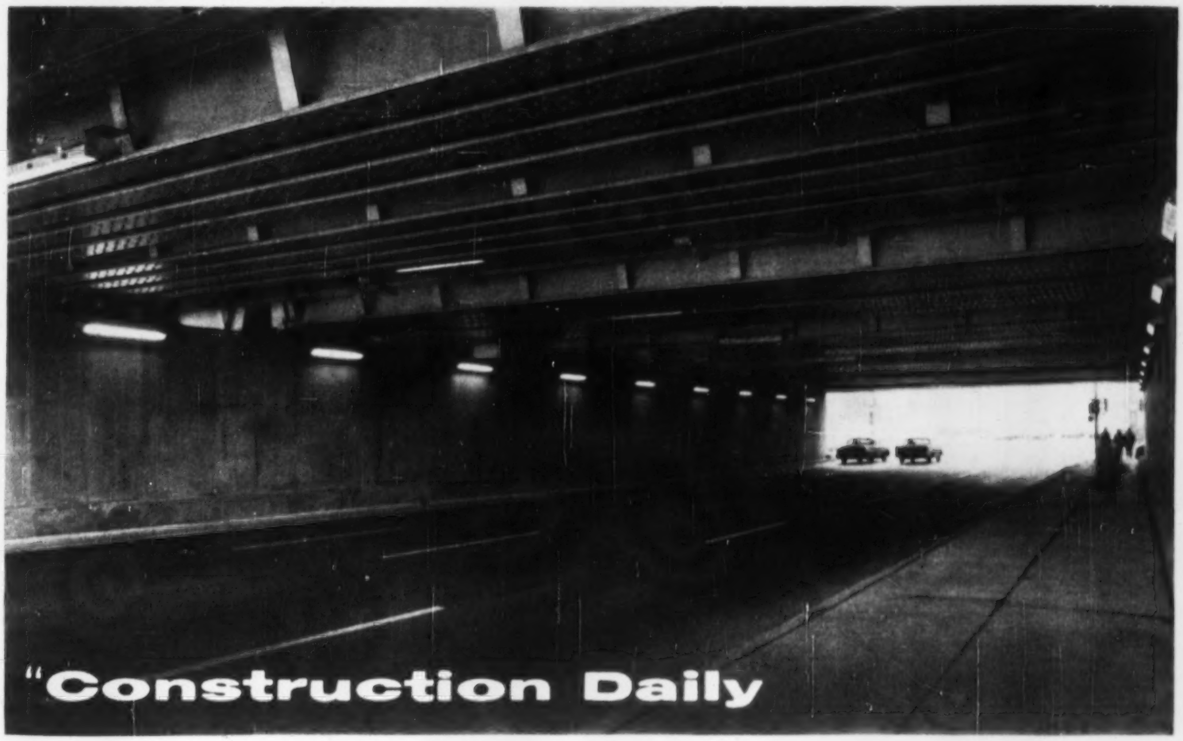
BUILDINGS—LB & CA

A. L. Bladholm Constr. Co., Marshall, Minn. CA **$773,500**, general contract. two connected buildings comprising ELEMENTARY SCHOOL and JUNIOR COLLEGE, ELY, MINN. Bd. Educ., Isabel F. Koski, clk., Ely, Minn. Bids Nov. 14. CD 11/21, under LB.

Hudson Bros., Worthington, Minn., LB **$395,000** (8 bidders), CHURCH and EDUCATIONAL WING, WORTHINGTON, MINN. Westminster Presbyterian Church, L. Lester, chn., Bldg. Comm., Worthington, Minn. Bids Nov. 7. CD 10/17.

▲ **Thomas Constr. Co.**, 1111 S. 8th and Box 549, St. Joseph, Mo., CA **$1,067,307**, 2 story, ground floor, L-shaped, brick, rein.-con., steel, cut stone trim

(Continued on page 164)



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Founded in 1900, the James McHugh Construction Company was soon to expand into all types of public and private works. They have completed a variety of multi-million-dollar contracts for schools, public housing, hospitals, industrial buildings, sewage and water treatment plants.

Among these are Chicago's West-Southwest Sewage Treatment Works ($18.5 million), Dayton's St. Elizabeth Hospital ($2.3 million), the Tonawanda, N. Y., Water Treatment Plant ($2.6 million), University of Illinois Residence for Men ($1.3 million), Cleveland's Lake Shore Housing Project ($4.7 million), a brewery for Pabst Brewing Co. ($3.5 million), and many others.

James McHugh Construction Company headquarters are at 6449 South Park Ave., Chicago 37, Ill.

(Continued from page 162)

CLASSROOM BUILDING, MARYVILLE, MO. Northwest Missouri State College, Luther G. Belcher, bus. mgr., Maryville, Mo. Bids Oct. 23. CD 10/31, under LB.

▲ **Chemical Constr. Co.**, 525 W. 43 St., New York 36, N. Y. CA, design and construct, 100 tons per day urea PLANT to produce urea in both prill and solution forms for inorganic chemicals division, EL DORADO, ARK. Monsanto Chemical Co., Lindbergh Blvd. and Olive St. Rd., Creve Coeur 24, Mo. CD 10/2.

Wilson Hargett Constr. Co., 611 Stuart St., EL Dorado, Ark., CA **$500,000.** 42,000 sq. ft. brick, veneer MFG. PLANT with 3,000 sq. ft. OFFICE. EL DORADO, ARK. El Dorado Industrial Development Corp., El Dorado, Ark. Prescolite Mfg. Corp., El Dorado, Ark., lessee. Marvin E. Frank, Armstrong Bldg., El Dorado, Ark., archt.

General Electric Co., Electric Bldg., Omaha, Neb., LB **$831,000,** Contr. 397, SUB-STATION, Jones Street Power Station, OMAHA, NEB. Omaha P. Power Dist., 17th and Harney Sts., Omaha, Neb. A. G. Johnson, c/o owner, ch. engr. Bids Oct. 29. CD 11/20.

Caro Constr. Co., 6629 E. Kellogg, Wichita, Kan., CA **$454,482,** general contract WOMEN'S DORMITORY and MEN'S DORMITORY, WICHITA, KAN. Friends University, 106 E. Second St., Wichita 2, Kan. Bids Oct. 30. CD 10/30.

Robert G. Parks, Inc., 4600 N. Oklahoma St., Oklahoma City 5, Okla., CA **$500,000,** 72-unit MOTEL and CAFE, N. E. Expressway and Turnpike Gate, OKLAHOMA CITY, OKLA. J. Phil Burns, Liberty Bank Bldg., Oklahoma City, Okla. Awarded Nov. 20. CD 9/23.

▲ **Tulsa Rig & Reel Co.**, Box 490, Tulsa, Okla., CA **$1,647,262,** McClain SENIOR HIGH SCHOOL, 4800 N. Peoria St., TULSA, OKLA. Bd. Educ., 410 S. Cincinnati St., Tulsa, Okla. Bids Oct. 29, awarded Nov. 4. CD 11/7, under LB;
Watt Plumbing & Air Conditioning Co., 525 E. 5 St., Tulsa, Okla., CA **$434,690,** mechanical and air-conditioning work for school (Tulsa, Okla.).

Chapman-Dalton Constr. Co., c/o Gus Thomasson Rd., Dallas, Tex., Force Account, **$394,000.** 40-low-priced DWELLINGS; **$350,500,** 33 DWELLINGS, DALLAS, TEX. CD 11/11.

Northgate Building Co., c/o Clyd T. McWilliams, 4219 Bowie St., Dallas, Tex. Owner Builds. **$369,500.** 31 DWELLINGS; **$376,175,** 33 DWELLINGS, DALLAS, TEX. CD 11/15.

▲ **H. A. Lott, Inc.**, c/o Wirtz, Calhoun, Tungate & Jackson, archts., 2506 Richton, Houston, Tex. LB **$1,281,700,** Phase III (all 4 jobs); remodeling 5 story BUILDINGS for WOMEN and 5 story BUILDING for MEN; 3 story GIRL'S APARTMENT; 2 and 3 story DORMITORY for WOMEN; four 2 story MEN'S CO-OPERATIVE HOMES, at college, HUNTSVILLE, TEX. Sam Houston State Teachers College, Huntsville, Tex. Bids Nov. 21. CD 9/17.

Art Reichart, Harmond Sanders & Assocs., 3105 Rice Blvd., Houston, Tex., Owner Builds. **$373,900,** 36 DWELLINGS; **$381,600,** 38 DWELLINGS, LOLITA, TEX. CD 9/24.

Cecil Jennings, Inc., 4802 College Ave., Lubbock, Tex., Owner Builds, **$350,000,** 29 DWELLINGS, LUBBOCK, TEX. CD 11/11.

▲ **Weaver Constr. Co.**, 5555 E. Evans St., Denver, Colo. CA **$1,326,619** general contract 3 story 136,400 sq. ft. RISHEL JUNIOR HIGH SCHOOL, Valverde Area, DENVER, COLO. School Dist. No. 1, 414-14th St., Denver, Colo. Gordon D. White & C. Clay Davis, 615 Columbine, Denver, Colo., archts.-engrs. Bids Nov. 6, awarded Nov. 20. Grand total $2,860,619. CD 11/14;
Johnson & Davis, 2235 Arapahoe, Denver, Colo. CA **$385,000,** mechanical work, Rishel Junior High School (Denver, Colo.);
Howard Electric, 1170 W. Custer Ave., Denver, Colo. CA **$149,000,** electrical work, Rishel Junior High School, (Denver, Colo.)

FAR WEST

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

STREETS AND ROADS

December 13, 20, Arizona January 22 California

BUILDINGS—BA

▲ **Calif., Los Angeles**—OFFICE—BA 12/19—Spring St., Realty Co., 621 S. Spring St., 15 story, 200,000 sq. ft., 273 ft. high granite and stone facing, steel framing, Q-cell sys. 3 basement floors for parking, office bldg. $10,000,000. Claud Beelman & Assoc., Robert E. Langdon Jr. & Ernest C. Wilson, Jr., 7421 Beverly Blvd., archts. CD 6/19.

▲ **Wash., Everett**—SCHOOL—BA 12/20—School Dist. No. 2, Everett, 1 story, 80x220 ft.; 80x226 ft.; 82x202 ft.; 135x154 ft. and 122x130 ft. frame bldgs., for Junior High School, $1,000,000. Plans deposit $40, W. A. Johnson & Assocs., 3506 Broadway, archts. CD 6/20/56.

HEAVY CONSTRUCTION—LB & CA

UTAH—State Rd. Comn., State Capitol, Salt Lake City,
R. M. Jensen, D. W. Brimhall & Nelson Bros., 347 W. 16 St., Salt Lake City, Utah. CA **$712,959,** Proj. No. F-035-1 (3) first Contr. 12.01 mi. 2½ in. road mix bit. surf. on State Rd. 259 from Buckskin Wash to Cook's Comb, Kane Co. Bids Nov. 6. CD 11/13, under LB.

ARIZONA—State Hy. Dpt., 206 S. 17th Ave., Phoenix, Bids opened 11/15,
Copper State Constr. Co., P.O. Box 863, Mesa, Ariz. LB **$582,316** (10 bidders) select material, aggreg. base, bit. plant mix, seal coat 6¼ mi. Globe-Lordsburg Hy., U. S. 70, Graham Co. CD 11/11.

† **Longley Constr. Co.**, P. O. Box 2104, Las Vegas, Nev. LB **$484,900** (4 bidders) exten. utility system and roads, ENG-04-353-58-10, FORT HUACHUCA, ARIZ. U. S. Eng., 751 S. Figueroa St., Los Angeles, Calif. Bids Nov. 19. CD 10/28.

▲ **WASHINGTON**—State Hy. Comn., Olympia,
Fiorito Bros., 1100 Leary Way, Seattle, Wash. CA **$704,161,** surf., c. conc. and b. conc. paving, installing illumination sys. and automatic sprinkler sys. on 2.039 mi. Primary State Hy. 2, Helena to Custer Sts. in Spokane, Spokane Co.; CA **$596,526,** bit. surf. frontage roads and cross streets, and constr. 3 rein.-con. flat slab bridges on 2.123 mi. Primary State Hy. 1, Connecticut St. to Northwest Ave. in Bellingham, Whatcom Co. Bids Nov. 19.

F. Coluccio Constr. Co., 7778 Seward Park Ave., Seattle, Wash., LB **$483,271,** est. $528,055 (8 bidders) interceptor sewer in Harbor Ave. S.W., SEATTLE, WASH. City, County-City Bldg., Seattle, Wash. Bids Nov. 20. R. W. Morse, Seattle, Wash., city engr. CD 3/27/56.

M. F. Castle Co., N. 10503 Division St., Spokane, Wash., LB **$82,560,** Schedules A and C, 4- to 10-in. concrete sewers in Francis Ave. and Cannon St., SPOKANE, WASH. City, City Hall, Spokane, Wash. Bids Nov. 21. CD 11/13;
Murphy Bros., E. 3728 Broadway, Spokane, Wash., LB **$125,531,** Schedules B, D and E (Spokane, Wash.).

▲ **CALIFORNIA**—State Dpt. P. Wks., 1120 N St., Sacramento,
Winston Bros. Co., 1532 S. California Ave., Monrovia, Calif., CA **$2,226,908,** grading 5.6 mi. and paving 3.4 mi. 4 lane divided freeway between Polk St. and 0.3 mi. north of Arlington Ave. on Sign Rte. 18 U. S. 91 in Riverside and constr. 3 overcrossings and 4 undercrossings, Riverside Co. Bids Nov. 7, awarded Nov. 22. CD 11/13, under LB.

CALIFORNIA—State Div. Hys., 1120 N. St., Sacramento,
Baun Constr. Co., 3229 W. Dudley Ave., Fresno, Calif. CA **$604,290,** grading, surf. about 11 mi. Lassen Ave., FAS Co., Rte. 809, between 015 mi. sw of 5 Points and 1 mi. ne of Fresno, Fresno Co. Bids Nov. 6, awarded Nov. 22. CD 11/13, under LB.

Walt Disney Productions, 2400 W. Alameda St., Burbank, Calif., Owner Builds. **$600,000.** PRODUCTION STAGE, 500 S. Buena Vista, BURBANK, CALIF.

M&K Corp., 519 California St., San Francisco, Calif. CA **$711,500,** 75 x 380 ft. grandstand, incl. water, sewers and electrical services, etc. for 2nd Dist. Agricultural Assn., W. O. 4174SC, 3612, SC 3501 SC 3976, STOCKTON, CALIF. State Div. Architecture, 1120 N. St., Sacramento, Calif. Bids Nov. 19, awarded Nov. 22. CD 11/25, under LB.

BUILDINGS—LB & CA

Harrington Constr. Co., 745 S. Center St., Reno, Nev. LB **$432,810,** 4 unit Stead Elementary SCHOOL and 1 multi-use wing, Stead Air Force Base, RENO, NEV. Washoe County School Dist., Courthouse, Reno, Nev. Vhay & Grow, 33 E. Truckee River Lane, Reno, Nev., archts.

Bell & Valdez Development Co., 14212 Eastgate Hill Blvd., Bellevue, Wash., Day Labor, **$480,600,** 35 HOUSES S. E. 10 St. and 163 Ave. S. E. BELLEVUE, WASH. CD 12/15/54.

▲ **J. P. Hopkins Constr. Co.**, Mercer Island, Seattle, Wash., LB **$822,000** (15 bidders) general contract 7 steel frame bldgs., totaling 84,000 sq. ft. for South SENIOR HIGH SCHOOL, 19 Ave. S. and S. 228 St., SEATTLE, WASH. Highline School Dist. 401, 253 S. 152 St., Seattle, Wash. Bids Nov. 19. CD 11/4;
Wenzler & Ward P. H. Co., 2109 Western Ave., Seattle 1, Wash., LB **$329,748** (9 bidders) mechanical contract (Seattle, Wash.);
Hooper Electrical Co., Inc., 215 Marion St., Seattle 4, Wash., LB **$91,290** (9 bidders) electrical contract (Seattle, Wash.).

Quality Builders, 5220 S. Orchard St., Tacoma, Wash., CA **$638,929,** MANAGEMENT-MAINTENANCE BLDG. alterations, repairs and addns. and 228 unit HOUSING in Salishan housing project, TACOMA, WASH. Tacoma Housing Auth., 132 Longview St., Tacoma, Wash. CD 9/6, under LB.

▲ **Rothschild, Raffing & Weirick**, 274 Brannan St., San Francisco, Calif., CA **$1,145,900** (Base Bid) MUSIC, SCIENCE, MATHEMATICS AND STATISTICAL FINANCIAL CENTER BLDG., BERKELEY, CALIF. Bd. Regents, University of California, Administration Bldg., Berkeley, Calif. Awarded Nov. 21. CD 10/23, under LB.

Hazen G. Gill, 1304 N. Potrero St., El Monte, Calif. Owner Builds. **$431,400,** 10,500 sq. ft. INDUSTRIAL BLDG., 1500 N. Potrero St., LA PUENTE, CALIF.

▲ **Wapner & Fremer**, 5542 Cahuenga Blvd., North Hollywood, Calif. CA **$1,579,495** Los Angeles City College addns., incl. WOMENS PHYSICAL EDUCATION BLDG. and CLASS ROOM BLDG., LOS ANGELES, CALIF. Los Angeles Bd. Educ., 1425 S. San Pedro St., Los Angeles, Calif. Bids Nov. 1. CD 11/7, under LB.

▲ **Cahill Constr. Co.**, 350 Sansome St., San Francisco, Calif., LB **$2,051,750** (7 bidders) 1st phase GOLDEN GATE SEMINARY (Academic Bldg., Recital Hall, Admin. Bldg., Cafeteria, etc.) Strawberry Point, MILL VALLEY, CALIF. Golden Gate Baptist Theological Seminary, 1908 Addison Ave., Berkeley, Calif. John Carl Warnecke, 111 New Montgomery St., San Francisco, Calif., archt. CD 10/20/53.

▲ **F. P. Lathrop Constr. Co.**, 800 University Ave., Berkeley, Calif., CA **$1,324,518,** Joaquin Miller HIGH SCHOOL, OAKLAND, CALIF. Oakland Unified School Dist., 1025 2nd Ave., Oakland, Calif. Bids Nov. 12, awarded Nov. 21. CD 11/15, under LB.

▲ **Continental Constr. Co.**, 4671 24th St., Sacramento, Calif. CA **$1,577,000** (4 bidders) Sutter JUNIOR HIGH SCHOOL, Alhambra Blvd. and J. St., SACRAMENTO, CALIF. Sacramento City Unified School Dist., 1619 N St., Sacramento, Calif. Bids Nov. 25. CD 11/1.

Wilsen Constr. Co., 339 N. Canon Dr., Beverly Hills, Calif., Owner Builds. **$441,000,** 3 story, 108x175 ft. stucco APARTMENT, 757 Ocean Ave., SANTA MONICA, CALIF. Jack Chernoff, 8690 Wilshire Blvd., Los Angeles, Calif., archt.

CANADA

HEAVY CONSTRUCTION—BA

STATE HIGHWAY LETTINGS

BRIDGES

December 11 Ontario

Que., Quebec City—GRAIN ELEVATOR, etc.—BA 12/19—National Harbors Bd., West Block, Parliament Bldgs., Ottawa, Ont., grain elevator addn. and imprvs. to handle increased capacities made necessary by St. Lawrence Seaway Proj., Quebec Harbor. Over $500,000.

BUILDINGS—BA

▲ **Alta., Calgary**—SCHOOL—BA 12/10—Alberta Dpt. P. Wks., Parliament Bldgs., Edmonton, addn. to "B" Bldg. at Provincial Institute of Technology and Art. $1,000,000.

BUILDINGS—SLC

▲ **Man., St. Boniface**—REFINERY—North Star Oil Ltd., 526 Panet Rd., soon lets contract, refinery project, incl. (1) Unifiner (2) platformer, $1,500,000. Universal Oil Products Co., 810 S. Michigan Ave., Chicago, Ill., U. S. A., engr.

HEAVY CONSTRUCTION—LB & CA

ONTARIO—Dpt. Hys., Parliament Bldgs., Toronto, Bids opened 11/20,
Ont.—**H. J. McFarland Const. Co. Ltd.**, Talbot St., Picton, Ont., LB **$697,981** (12 bidders) Contr. 57-182, grading, gran. base 6.7 mi. Hy. 17, North Bay;
Ont.—**E. & E. Seegmiller Ltd.**, 525 Wendell Ave., Kitchener, Ont., LB **$251,497** (13 bidders) Contr. 57-203 grading, gran. base 7.7 mi. Hy. 86, Wingham. CD 10/24.

ONTARIO—Dpt. Hys., Parliament Bldgs., Toronto,
Curran & Briggs Ltd., 61 Haverson Blvd., Toronto, Ont., CA **$512,865** (3 bidders) Contr. 57-246, gran. base, hot mix paving 15.1 mi. Hy. 71, Barwick. Bids Nov. 20. CD 11/11.

BUILDINGS—LB & CA

Dominion Constr. Co., Ltd., 195 W. 2nd Ave., Vancouver, B. C., CA **$500,000,** 2 story rein.-con. COMMISSARY containing 28,000 sq. ft. central kitchen, cold storage and freezer room, Marine Drive and Fraser Ave., VANCOUVER, B. C. White Star Restaurants Ltd., 8216 Granville, Vancouver, B. C. Dominion Constr. Co. Ltd., 195 W. 2nd St., Vancouver, B. C., engrs.

▲ **Malcom Constr. Co. Ltd.**, 554 Pembina St., Winnipeg, Man., CA **$1,000,000.** 1 story, 300x360 ft. steel, concrete block walls, concrete fdns. of piles, WAREHOUSE, TRANSCONA, MAN. International Harvester Co. of Canada, Portage and Burnell Sts., Hamilton, Ont. Kyles & Kyles, 247 John St. S., Hamilton, Ont., archts. Awarded Nov. 20.

Frank Van Bussel & Sons, R.R. No. 3, Lucan, Ont., CA About **$500,000** (13 bidders) 2½ story, T-shaped, structural steel, brick, block MONASTERY, DELAWARE, ONT. Priests of Sacred Heart, Very Rev. P. Renders, 150 King St., London, Ont. Bids Nov. 18, awarded Nov. 20. CD 11/8.

▲ **C. A. Parsons & Co. Ltd.**, Heaton Works, Newcastle Upon Tyne 6, England, CA Approx. **$10,000,000,** two 300,000 kw, turbo-generators for 1,800,000 kw THERMAL-ELECTRIC GENERATING PLANT, TORONTO, ONT. Ontario Hydro Electric Power Comm., 620 University Ave., Toronto, Ont. CD 8/30.

Bernier & Gagne Ltee., 460 Blvd. Boivin, Granby, Que., CA Est. **$500,000.** 65,000 sq. ft. FACTORY, GRANBY, QUE. Muller & Knocker, Bonn, West Germany, c/o Horace Boivin, mayor, Granby, Que. Paul O. Trepanier, 135 Principal St., Granby, Que., archt. Awarded Nov. 15.

Realty Corp., Ltd., 3425 Davidson St., Montreal, Que., Owner Builds, **$472,500,** 27 duplexes, HOUSING, 10th Ave. between 39th and 40th Sts., ST. MICHEL, MONTREAL, QUE.

U. S. POSSESSIONS

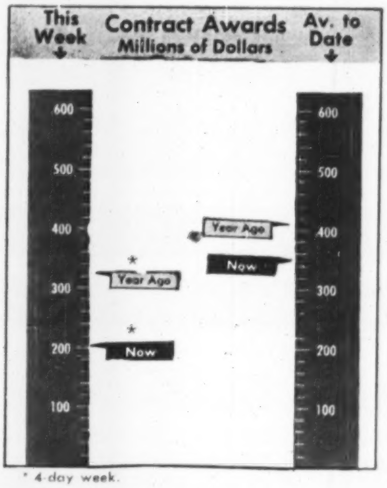
BUILDINGS—LB & CA

▲† **M. J. Brock & Sons, Inc.**, 2894 Rowena St., Los Angeles, Calif., CA **$4,123,190,** 250-unit Capehart HOUSING, ENG-58-2, Fort Shafter and Tripler Army Hospital, OAHU, T. H. U. S. Eng., Honolulu Corp. Ala Moana and South St., Honolulu, T. H. CD 11/4, under LB.

(Proposal Advertisement see pp. 180 and 181)

Construction Scoreboard

Activity this Week



* 4-day week.

AMOUNT OF CONTRACTS LET

By Ownership	This Week	Cum. 49 wks 1957	Chge '56-'57
	millions		%
Federal	$6.4	$2,139.0	+33
State and Municipal	118.8	7,029.3	+14
Total Public	125.2	9,168.3	+18
Total Private	75.8	8,051.6	−36
U. S. Total	$201.0*	$17,219.9	−16

By Type of Work			
Waterworks	$3.0	$340.5	0
Sewerage	8.2	519.5	−7
Bridges	17.7	753.9	+26
Highways	33.0	2,807.3	+20
Earthwork, Waterways	2.5	946.5	+37
Buildings:			
Public, Excl. Housg.	51.7	2,242.8	+13
Public Housing	2.5	610.9	+103
Private Housing	30.6	2,915.4	−43
Commercial	13.3	1,661.3	−10
Industrial	27.2	2,970.9	−41
Unclassified	11.3	1,447.9	−14
U. S. Total	$201.0*	$17,219.9	−16

* 4-day week.

NOTE: Minimum size projects included are: Waterworks and waterways, $44,000; other public works, $73,000; industrial buildings, $93,000; other buildings, $344,000.

NEW CAPITAL FOR CONSTRUCTION

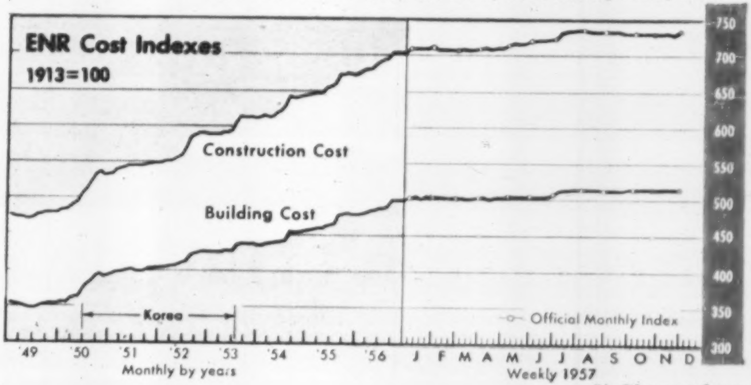
	Week of Nov. 28	Cum. 48 wks 1957	Chge '56-'57
	millions		%
Corporate Securities	$128.8	$5,563.1	+26
State and Municipal:			
All Except Housing	95.2	5,278.8	+24
Housing	...	156.8	+71
Federal Loans	1.5	186.4	+39
Federal Aid	...	2,161.2	+102
Total Nonfederal	$225.4	$13,345.4	+33
Federal Appropriations:			
In U. S.	...	$2,777.0	−20
Outside U. S.	...	29.0	+82
Total New Capital	$225.4	$16,151.4	+20

Cost Indexes as of Now

ENR INDEXES (1913=100), 20-cities' average	Week of Nov. 28 1957	% Change from Oct. 31 1957	% Change from Nov. 29 1956
Construction Cost	737.98	+0.1	+4.9
Building Cost	517.43	+0.1	+3.5

*Official Monthly Index for December

To convert above indexes to 1926=100: Divide Construction Cost by 2.080; Building Cost by 1.85
1949=100: Divide Construction Cost by 4.770; Building Cost by 3.5



WAGE RATES, 20-cities' average	Dec. 1957	% Change from Nov. 1957	% Change from Dec. 1956
Common	$2.344	+0.3	+6.9
Skilled (average 3 trades)	3.629	+0.6	+5.7
Bricklayers	3.865	+0.03	+4.2
Structural Ironworkers	3.624	0	+6.2
Carpenters	3.341	+0.3	+5.1
Equipment operators (average three types)	3.242*	+0.2**	+5.3*

*November **October

MATERIAL PRICES, 20-cities' average			
Structural Steel (average 3 mills), per cwt.	$5.275	0	+5.5
Lumber, 2x4 Fir, per M fbm	113.49	−1.0	−2.8
Lumber, 2x4 Pine, per M fbm	99.90	−0.5	−2.9
Cement, bulk, per bbl	3.923	0	+3.9
Sand, per ton	2.487	0	+3.2
Ready-mixed concrete, per cu yd	13.721	+0.2	+2.4
Gypsum sheathing, ½"x2'x8', per Msf*	63.110	0	+1.4
Fiber board sheathing, ½" sq. ed., per Msf*	71.300	0	+1.8
Mineral wool insulation, 3' batts, per Msf*	71.063	0	−0.2
Crushed stone, 1½", per ton, CL	2.810	0	+0.6
Concrete blocks, sand/gravel, 8"x8"x16", each*	.229	0	+1.3
	Nov. 1957	Oct. 1957	Nov. 1956
Brick, common, per M	$37.588	−0.3	+1.1
Lime, hydrated finishing, per ton, CL	36.644	+0.1	+5.3
Structural clay tile, 3x12x12", per M, 2,000 up*	182.873	−0.4	+4.2
Vitrified clay sewer pipe, std 12", per ft	1.312	0	+3.4
Concrete sewer pipe, 12", per ft	1.231	0	+8.0

*Delivered, trucklots

ENR INDEX REVIEW

	Construction Cost		Building Cost		Volume	
1956	1913=100	1949=100	1913=100	1949=100	1913=100	1949=100
Dec	703.82	147.55	500.17	142.18	624	180
1956 Average	692.37	145.14	490.76	139.50	671	194
1957						
Jan	707.90	148.40	501.96	142.69	504	146
Feb	710.06	148.85	502.59	142.87	546	158
Mar	708.64	148.56	501.37	142.52	553	160
Apr	709.30	148.69	501.37	142.52	564	163
May	715.70	150.04	503.01	142.99	553	160
Jun	721.36	151.22	504.17	143.32	588	170
Jul	724.15	151.81	506.62	144.01	587	170
Aug	738.63	154.84	516.90	146.93	528	153
Sep	737.78	154.66	516.12	146.71	466	135
Oct	737.14	154.53	516.78	146.90	506	146
Nov	737.43	154.59	516.81	146.91	457	132
Dec	737.98	154.71	517.43	147.08	...	...
1957 Average	723.84	151.74	508.76	144.62	...	...

Any One Can Make a Mistake, But . . .

With insurance . . .

MR. A, a consulting engineer, designed the heating plant for a large housing project. After construction was completed, heat failed to rise above the first floor apartments. Local government authorities blamed the engineer's insulation specifications, and charged and recovered from him $3,000 to correct the error. The engineer's insurance adjusters handled details and paid $2,500 above the $500 self-insuring or "deductible" clause.

Without insurance . . .

MR. B, a consulting engineer, designed a storage building. When its roof collapsed after a year, the cause was traced back to rusted roof supports, which resulted from insufficient ventilation. The engineer, having no insurance protection against errors, retained a lawyer and fought the case in court. The court found for the owner. The engineer paid a $25,000 judgment and another $3,000 in attorney's fees—out of his own pocket.

Errors Don't Have to Bankrupt You

"To err is human," but it also can be expensive—particularly in the fields of engineering and architecture. In a cost-conscious world, forgiveness is usually forthcoming only if expenses resulting from errors are covered by the individual who made the mistake.

And recognizing this economic fact of life, engineers are taking a closer look at insurance that provides financial protection against their possible mistakes. Similar to malpractice insurance well established in some other professions, policies are available that engineers and architects to pay for errors made by the head of the firm, his employees, or anyone he may engage to handle part of a job. The insurance, known as "professional liability" or "errors and omissions" insurance, also covers the cost of defense against claims. In the opinion of some, this last is its most valuable feature.

Only last year, at least one engineer found that his four-month-old policy repaid its premium many times over. He had designed a sewer system for a small Midwestern city. After construction it was found that the size of one section of pipe had been miscalculated. The city ordered the work replaced and charged to the engineer $50,000. That charge, less the $1,000 deductible clause in the engineer's policy, was paid promptly by the insurance firm.

Recently, after careful study, several architectural and engineering societies placed their support behind this type of insurance. The American Institute of Architects, the National Society of Professional Engineers and the New York State Society of Professional Engineers have endorsed policies for their members. For the last three years, the New York Association of Consulting Engineers has backed a Lloyd's of London policy.

Now, the Consulting Engineers Council, which represents 19 associations including the New York association, voted to back a policy being written by a U.S. insurance company.

But some other professional groups, such as the American Institute of Consulting Engineers and the American Society of Civil Engineers, have taken no official stand on the question.

• What it covers—The policies offered today insure partnerships, sole proprietorships and engineering corporations against:

1. Negligent acts, and errors or omissions in the usual professional work of the firm head or any employee, technical or nontechnical. Errors made in supervising construction also are covered if supervision is part of the firm's usual activities.
2. The same as above for any engineer, architect or firm engaged as subcontractor on work for which the insured is responsible.
3. Cost of defense against claims. The defense usually is handled by the insurance company. But in special cases—highly technical disputes, for instance—outside lawyers may be retained, with the insurance company paying their fees.

For some activities, such as boundary surveys, subsoil testing, bridge or tunnel design, and fairs and exposition work, the errors and omissions insurance is available, but at a higher premium cost because the insurance companies consider these as "high risk" fields.

All policies exclude incidents ordinarily covered by other types of insurance. If the engineer's employees are injured on his premises, he probably would be covered by a workmen's compensation policy.

Coverage offered in the three major-company policies protects the engineer when an error results in injury or property damage or when there is simply recognition that an error exists that must be corrected. For example, if a window or similar detail were left out of an engineer or architect's blueprints and the omission later discovered, the insurance would cover the claim.

• Costs vary—Societies endorsing this type of insurance are not usually involved in its administration. The insurance is offered directly to the firm, which is rated individually. The rating is based on some or all of these criteria: gross receipts, type of work done, value of construction handled yearly, and number of technical and non-technical employees. Two policies also ask about membership of the firm heads in professional societies. Society members, it is reasoned, are generally more highly qualified than someone not in a professional society and therefore better risks. For this reason, society membership is expected to bring with it a lower premium charge.

Cost of professional liability insurance therefore varies from firm to firm. The company with many employees and a large volume of business is assumed to run a greater risk of error and therefore pays a higher premium. Because of such rating methods premiums may vary by as much as 50% for an amount of protection.

All policies include a deductible, or

self-insuring feature. The minimum deductible is usually $500, above which claim payments begin. Naturally, the higher the deductible the smaller the premium charge for coverage. The deductible clause does not apply to any costs the policyholder incurs for defense. The insurance policy pays the full amount, even if less than the deductible amount of the policy.

Minimum insurance coverage is usually $25,000 and the maximum, $250,000, although the U. S. companies offer higher amounts by special arrangement. Lloyd's has no standard maximum and probably could offer up to $15 million in coverage.

Insurance payment is made on the dollar total of claims against a policyholder in a year. If his coverage is for $50,000 and two $30,000 judgments are brought against him in one year, the insurance will pay only $50,000.

Another feature of these policies is their coverage of errors and omissions committed before the beginning of the policy period. Lloyd's and one U. S. company—the Fidelity and Casualty Co.—will protect against all previous errors and omissions from the date the firm was founded, provided the errors were not discovered before the insurance was bought. The other major U. S. firm—Continental Casualty Co.—offers the same protection, but by special option and at a slightly higher premium.

The Lloyd's policy offers world-wide coverage. Policies of U. S. firms offer protection for acts or omissions committed in the U. S., its territories and possessions, and Canada.

• Who needs it?—Some engineers and architects have held errors and omissions policies for years. Theodore Kaufteld, New York City consulting engineer, believes that "this insurance is a must for every engineer putting a seal on drawings." It has become more important in recent years, he said, because the scale of engineering has enlarged.

Another reason, he added, is that "clients are more claims-conscious, and so there are more suits. With larger amounts of money at stake, the client wants to get something back if there are errors."

The increase in the number of claims also is recognized by lawyers, insurance specialists and some builders questioned by ENR. An engineer, an insurance man said, should expect to be brought into a case if he has had any connection at all with the job. If lawyers think they can get compensation from the engineer for their clients, they usually will try.

How Much It Costs

Premium charges for errors and omissions insurance for engineers vary, but the following are some representative costs for such protection according to firm size, number of employees, amount of coverage and deductible electives.

Number of employees	Gross receipts	Annual premium for $25,000 policy $500 deductible	$100,000 policy $1,000 deductibel
2 partners, 12 technical, 2 clerical	$250,000	$320	$525
2 partners, 7 technical, 3 clerical	$150,000	$225	$390
2 Partners, 4 technical, 2 clerical	$100,000	$185	$300
1 Partner, 4 technical, 1 clerical	$60,000	$150	$245

The defense alone can cost an engineer much time and money, a lawyer pointed out, although an engineer generally will clear himself of responsibility. Insurance would be valuable, in his opinion, if only because the insurance company takes over a large part of the defense work and all its costs.

If an engineer's plans are checked by inspectors does this relieve him of responsibility for design errors in the finished work? Several lawyers agreed that this was no sure protection. One said that if negligence can be proved, the courts usually will agree that an engineer's responsibility for sound design cannot be transferred to an inspector unless specified in the contract with the client.

Why, then, are errors and omissions policies carried by only a minority of engineers? Are they, as one engineer thought, like automobile drivers who comfortably assume they don't need collision insurance because they have never had an accident?

Or is this feeling of security the result of a close, personal relationship sometimes enjoyed by the engineer and his client? One man, a consulting engineer, thought such a relationship was sufficient protection for him.

"I don't need insurance," he said, "because my client and I can always work out any problems without dispute." However, he agreed that without this relationship, an insurance policy might be good protection.

Some engineers believe that the holding of an errors and omissions insurance policy is not consistent with professionalism. They say it is an "insult" to offer such a policy to a professional engineer. This group argues that an engineer is obliged to serve his client in good faith and if he holds insurance against errors it could indicate an unwillingness to back up his work properly.

Many of the same pro and con arguments heard when malpractice insurance for doctors and lawyers was first introduced are being revived for engineers and architects. Some believe a client will lose confidence in the engineer's work if he carries insurance but, on the other hand it is acknowledged that the client may want the engineer to have resources (such as insurance) to cover errors, which could involve sums well beyond the engineer's assets. Some engineers have reported that clients are starting to request errors and omissions insurance as a contract condition.

• Who offers it?—Errors and omissions insurance for engineers and architects currently is available from three major insurance companies. Lloyd's of London, which has offered a policy since 1945; Continental Casualty; and Fidelity and Casulty Co. Fidelity's policy has not yet been accepted by insurance commissions of a few states, but, as the newest of the three policies, it is expected to be available soon throughout the country.

With U. S. firms in this market, Lloyd's policy now can be obtained only by direct contact with the company in London or through its Canadian representatives. This is true except in Kentucky and Illinois, the only two states in which Lloyd's is a licensed company. In other states, brokers cannot legally handle insurance of a non-licensed company once a licensed firm starts writing a comparable policy.

Moving Ahead—Maybe

City approval of Lincoln Square may be balked

Approval by New York City's Board of Estimate last week of the $105 million Lincoln Square project brings it a long step closer to reality. The development is to be the largest single one in the nation under the Title I phase of the urban renewal program. After obtaining the board's approval, the city set Dec. 28 as the target date for acquisition of 68 acres of blighted properties on Manhattan's west side. But this schedule may be upset by new legal opposition to the project.

Harris L. Present, chairman of the Council on Housing Relocation practices, plans to request a temporary injunction against the project as a first step. He will also ask for a declaratory judgment that the resale of property at a loss to Fordham University constitutes government aid to a private, sectarian institution in violation of the separation of church and state clauses in state and federal constitutions.

Mr. Present, who is coordinating the opposition of several local groups, stated,

"Our purpose is to kill the Lincoln Square project, not just to delay it. To that end we will move promptly. If it becomes necessary to carry our fight to higher courts we will follow through without delay."

Much of the opposition stems from the belief that it would be hard to relocate adequately the 6,500 families and businesses in the area, despite contrary assurances by city officials. A recent report of the City Planning Commission declared that an ample supply of housing exists for displaced families.

Cost of the project to private developers will be $163 million, according to the latest estimates. The federal government's contribution to the cost of land acquisition, relocation of facilities and businesses, and the loss from resale will total $28 million. City costs will amount to $14 million.

Details of the Lincoln Square plan have changed several times since studies were begun in 1955, but the project as approved by the Board of Estimate, with some minor details still unsettled, consists of:

- Private housing totaling 4,500 units. Webb & Knapp Lincoln Square Corp. will sponsor 4,100 rental units, and the Lincoln Guild will back 400 cooperative apartments. Space for stores and offices will also be provided.
- A cultural center, to include a new Metropolitan Opera House and halls for the New York Philharmonic and a local ballet group. The Lincoln Performing Arts Center, Inc., will sponsor these projects.
- A campus for Fordham University large enough to accommodate 4,000 students.
- A public park with bandshell and seating facilities for 3,500 persons.
- Several smaller structures, including a public school and either a church or an institutional building.

The city's park department has plans for an 800-car garage under the arts center.

No longer part of the project is a huge theater center proposed by New York theatrical interests (ENR Feb. 7, p. 17). The six theaters were dropped when federal housing authorities refused to include them in the allotment of federal money.

Architects for Lincoln Square are Skidmore, Owings & Merrill. The firm reports that detailed planning of individual structures is "moving along rapidly."

(B&F continued on page 172)

Construction Markets

Midland, Tex.: An On-the-Spot Report

Geography and geology have combined to push the west Texas city of Midland (pop. 21,718) into what is believed to be a healthy building boom. Although the city may not be among the largest or best known cities of the nation—or Texas—on a comparative basis it may rank among the busiest.

Because Midland is headquarters for the Permian Basin—the largest and most active oil reserve in North America—the city ranks fifth in the nation as an oil center. More than 600 oil and oil servicing companies have offices here, and it is believed that more drilling contracts are let and more oil field equipment is purchased in Midland than in any other city of the world.

Some of this affluence has rubbed off on the building industry. By mid-September, building permits representing more than $22 million in construction had been issued. This total equaled the record for the full year of 1952, and R. B. Lamberson, city building superintendent, said that "in 1957 we'll easily hit the $25 million mark."

City officials and bankers emphasize that the current activity is "not a boom such as we had in 1952, which grew out of the discovery of a promising local oil field. That boom later collapsed, but now we are in a period of orderly expansion."

Growth, as reflected by building permits, has been constant during the last four years, but this year it has been more apparent. According to the Bureau of Business Research at the University of Texas, Midland had a 63% increase in building during the first six months of 1957, compared with the first half of 1956. This was the largest increase by any major city in Texas.

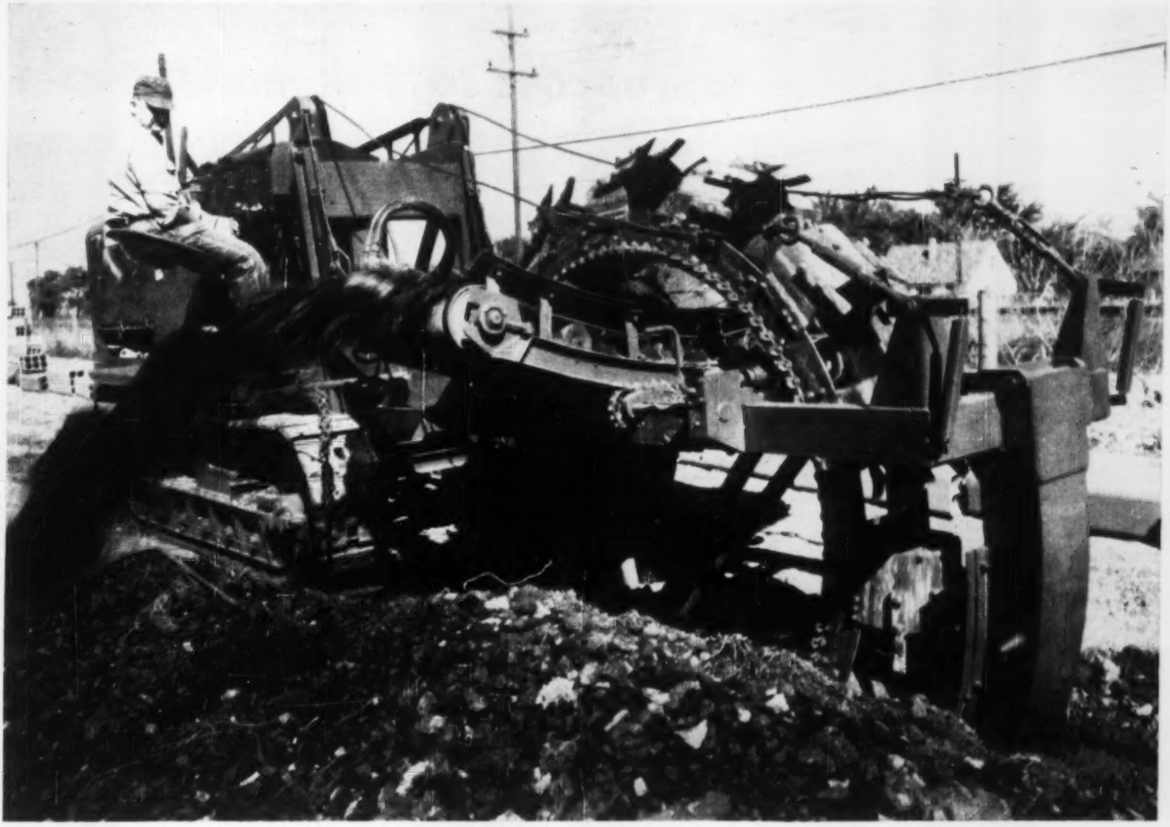
A small city with a big city skyline, some typical building jobs include a five-story addition to an existing office building, which will bring total height to 22 stories; a seven-story addition to a bank building, an addition to a hospital, and a new library, high school and new retail structure, for a total of $4 million.

The largest project, and only recently started, is a $4 million, eight-story building. Close to another $4 million in schools and churches is on the drawing boards while several 10 to 16 story buildings whose value has not been announced are in design.

Private housing is in an unusually promising situation.

Homebuilders and real estate agents are flourishing, with some seeing no end to the demand and the more cautious saying that the housing pace will continue at its present rate for at least one year more. Others report that they know of at least 2,000 houses to be started in the coming year. Perhaps the homebuilders' only difficulties revolve around labor, for skilled workers are now becoming a scarce commodity. However, common labor and materials are in good supply.

MIDLAND construction boom provides a small city with an imposing skyline.



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C. J. Langenfelder and Son, Inc. (The Whiting-Turner Contracting Co., Sub-contractor)	54,984 sq. ft. of I-Beam-Lok

Supervising Engineers for Project:
J. E. Greiner Company

Design Engineers for Approach Sections using AmBridge I-Beam-Lok:
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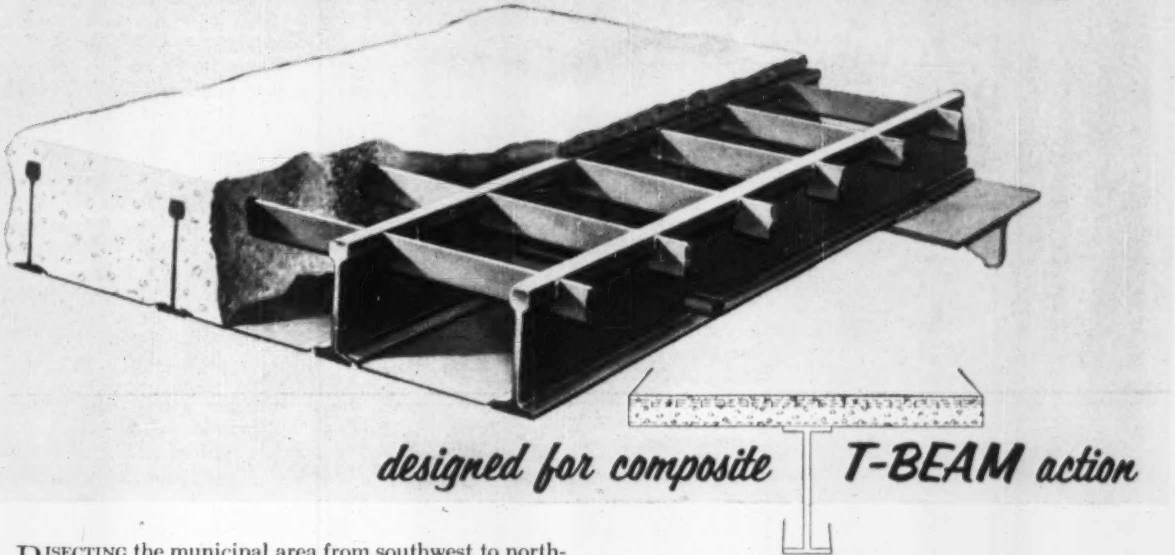
Patapsco Tunnel—

557,043-sq.-ft. USS AMBRIDGE I-BEAM-LOK concrete-filled flooring



BISECTING the municipal area from southwest to northeast, Baltimore's $130 million Patapsco Tunnel expressway is nearing completion.

Due to be opened before the end of 1957, this broad new 4-lane cross-town route runs 17.6 miles through congested waterfront and residential districts on viaducts and through a 7,650-ft. twin-tube tunnel deep beneath the busy harbor traffic of the estuary.

To take care of the heavy traffic this new expressway will get . . . and to hold weight and maintenance to a minimum, much of the roadway flooring on the approach viaducts is of the solid grid type—557,043 sq. ft. of which is USS AmBridge 4¼" I-BEAM-LOK concrete-filled flooring designed for composite T-Beam action. To provide still greater durability, a 2" blacktop wearing surface was applied to the ¾" concrete overfill.

The composite T-Beam action means that the floor slab (I-BEAM-LOK) and the supporting steel stringers are so welded together, making use of the 4¼" beams as shear connectors, that they cooperate as a single structural member in resisting some dead loads and all live loads. This saves a substantial amount of structural steel and facilitates erection.

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Completely fabricated units ready to install are delivered to the job site in the proper erection sequence. Top-side erection eliminates scaffolds and forms. And, since the pans are already installed, the concrete filler can be poured as the job progresses with little or no interference with other phases of construction.

Concrete-filled I-BEAM-LOK Flooring is available in 3" depth (weighing 47 lbs. psf.) as well as in the 4¼" depth (weighing 58 lbs. psf.). Open-type I-BEAM-LOK is available in 5" depth which weighs only 18.8 lbs. psf.

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The Cost of A-Power

AEC invites manufacturers, utilities and builders for examination of the program

The Atomic Energy Commission this week is in the midst of a careful appraisal of the civilian a-power program. Representatives of 34 utilities, 25 reactor manufacturers, and 32 architect-engineering firms are in Washington advising the commission on long-range policy on civilian power. The meeting began on December 2.

The calling of the meeting was an acknowledgment that something is wrong with the program (see also page 192). Evidence of this had come from previous meetings and late in November, the Joint Committee on Atomic Energy held a two-day seminar to seek the same answers being sought by AEC.

What it all adds up to is this: Atomic power costs have proved to be far higher than first anticipated. The market for reactor manufacturers has failed to develop into a profitable business. Consequently, manufacturers are curtailing their activities in this field, or dropping out, and it is questionable how many more utilities will come forward to build atomic power plants.

The question being debated in Washington therefore, is what is needed to stimulate the growth of atomic power.

Sen. Albert Gore of Tennessee, Rep. Chet Holifield of California, and Rep. Melvin Price of Illinois are known to be working on a bill calling for a large program of federal power reactor construction. The argument in favor of such legislation is that U.S. international policy demands that working power reactors be demonstrated by the U.S. as a measure of its world leadership in atomic affairs. Private industry can't do the job because of the costs, the argument goes.

The other form of program not yet formulated, but anticipated from AEC, is greater federal subsidy for private industry in the construction of power reactors. The argument in support of this program is to maintain the development of atomic energy in private industry hands as far as possible.

Several industry representatives in the past few weeks have spoken out in favor of subsidy for atomic power development.

The issue will be discussed when Congress meets in January. The chances are that the program, now running at about $150 million a year, will be expanded substantially.

(B&F continued on page 175)

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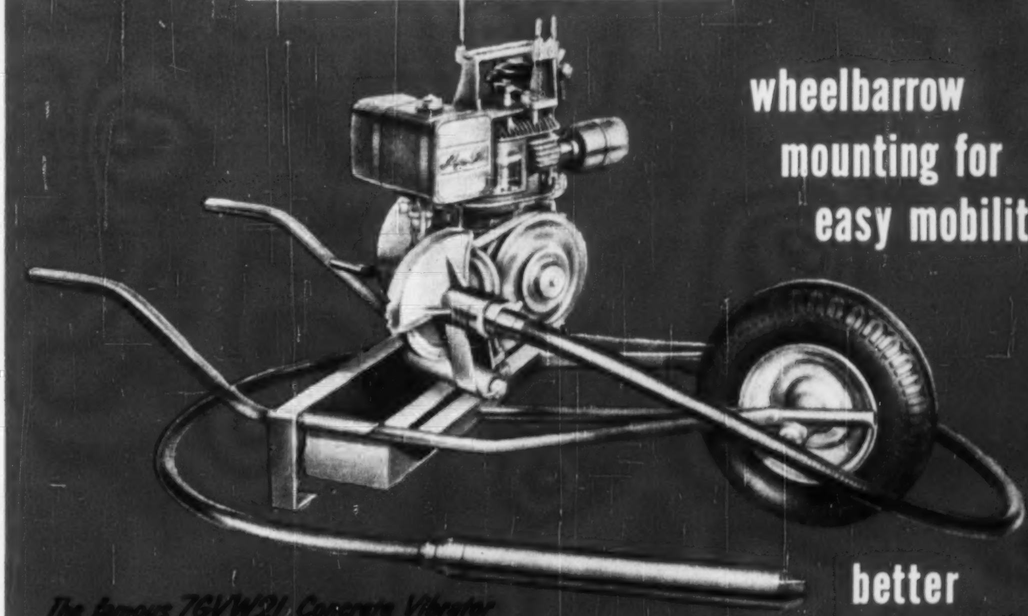

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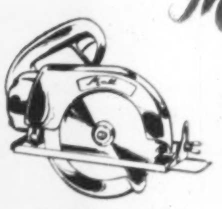

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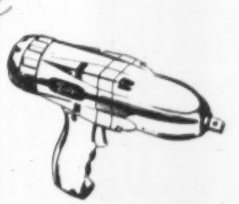

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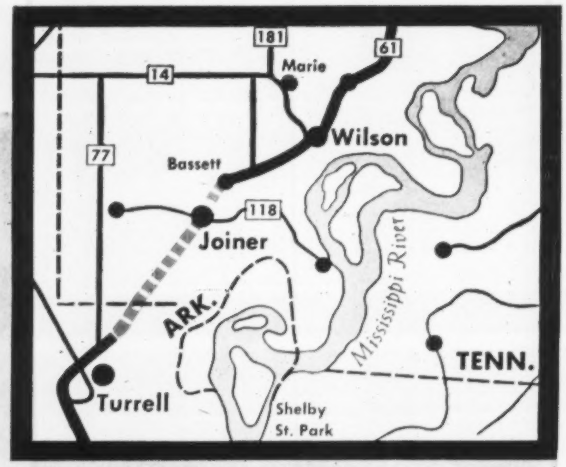

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November Contract Awards Show Drop

Volume 9% under October and 15% below first 11 months of '56; federal contracts show small gains

Heavy engineering construction awards during November dropped to the year's lowest point.

At $1.2 billion, awards were 9% below the weekly rate during October and 11% under November 1956. Public contracts for the four-week month were slightly higher than October on a weekly average basis, with the 2.8% gain in federal awards offsetting a small decline in state and municipal contracts.

For the first 11 months, construction awards slid 15% below last year in dollar volume to just over $17 billion. Private work, at $8 billion, was 36% below the 1956 figure. Public projects, of more than $9 billion, were 18% ahead of last year. Federal contracts through November moved 36% ahead of 1956, while state and municipal awards were up 13%.

In private work, only commercial building showed gains. Contracts were 16% over the October weekly rate and 8% over last year's November figure. A $20 million insurance office in Newark, N. J., and $15 million office building in New York City, and a $10 million amusement center at Long Beach, Calif., bolstered commercial awards.

The leader among public projects was the $41.6 million Throgs Neck Bridge contract in New York. This carried public bridge awards in November up to $120 million, the best month on record.

Earthwork, irrigation and drainage projects were $49 million in November, aided by an $8.9 million contract for Oahe reservoir in South Dakota and two awards totaling $11 million for the Lewiston, N. Y., power project.

Public buildings (excluding housing) topped all classes of public awards in November, though the $207 million of contracts recorded fell 3% short of October. Included were a $21 million social security building for Baltimore, Md., and a veterans' hospital job of $19.9 million in California.

As a region, only New England, with an 8% gain in contracts, is ahead of the first 11 months of 1956. Three individual states in the Middle Atlantic region, five in the South, two in the Middle West, five in the West of Mississippi region, and three in the Far West are well ahead of 1956 in contracts awarded.

Private mass housing so far this year has total awards of slightly less than $2.9 billion, which is a 43% decline from last year's same period. The Middle Atlantic region was strong in this category for November with awards of $70 million, while New England was low with awards of $17.5 million.

The Middle Atlantic region was also tops in commercial buildings awards in November with a total of $51.9 million, with the South low at $2 million.

Construction, Building Costs Indexes Are Higher

Construction costs in November continued to rise slowly, as measured by ENR's Construction Cost and Building Cost Indexes. The Construction Cost Index climbed .11% in November, compared to a .04% rise in October.

The Building Cost Index rose .13% in November, compared with the .06% increase in October. The Construction Cost Index now stands at 737.98, up from the 737.14 reading in October. The Building Cost Index now at 517.43 moved upward from the 516.78 reading for October. Both indexes are based on 1913 = 100.

During the month of November, both indexes dipped slightly, but then reversed themselves to attain the present higher level. The fluctuation reflects offsetting changes in lumber price and wage rate trends. Wages have risen steadily, while lumber continued to fall in price.

Engineering Construction Contracts — November '57

ENGINEERING NEWS-RECORD *reports continental U. S. construction projects of the following minimum costs—waterworks, excavation, drainage and irrigation, $44,000; other public works, $73,000; industrial buildings, $93,000; other buildings, $344,000.*

Four Weeks Thousands of Dollars (000 Omitted)

	November, 1957							U. S. Cumulative Eleven Months		%	Canada
	New England	Middle Atlantic	South	Mid-West	West of Mississippi	Far West	Total U. S.	1957	1956	Change ,56 to '57	November 1957
Public Works											
Waterworks	859	2,099	2,559	12,375	6,769	1,944	**26,605**	**337,552**	335,737	+ 1	1,774
Sewerage	3,583	11,048	2,147	10,049	6,164	5,693	**38,684**	**511,215**	548,810	− 7	2,879
Bridges	3,298	66,484	6,667	27,863	10,613	5,101	**120,026**	**726,835**	587,278	+24	4,352
Earthwork and waterways	727	15,202	1,351	2,199	15,592	14,354	**49,425**	**944,158**	677,600	+39	5,981
Streets and roads	11,421	61,206	16,244	28,118	44,385	22,492	**183,866**	**2,774,418**	2,311,298	+20	6,195
Public buildings, residential	389	5,476	4,963	3,034	2,496	1,013	**17,371**	**607,997**	294,699	+106	1,298
Other public buildings	10,553	41,548	36,744	26,578	36,151	55,324	**206,898**	**2,191,070**	1,939,146	+13	12,023
Unclassified	698	5,616	1,088	1,880	4,467	10,377	**24,126**	**949,912**	975,239	− 3	9,274
Total public	**31,528**	**208,679**	**71,763**	**112,096**	**126,637**	**116,298**	**667,001**	**9,043,157**	**7,669,807**	**+18**	**43,779**
Federal government (included in above classifications)	810	27,386	3,148	2,517	30,324	42,506	**106,691**	**2,132,548**	1,567,849	+36	14,512
Private											
Bridges						750	**750**	**9,426**	4,404	+114	
Industrial buildings	27,559	25,669	11,299	42,466	33,927	10,813	**151,733**	**2,943,892**	4,938,069	−40	7,229
Mass housing	17,452	70,099	49,299	51,726	27,842	29,313	**245,731**	**2,884,716**	5,054,957	−43	7,596
Commercial buildings	10,381	51,933	2,023	20,873	37,649	27,559	**150,418**	**1,651,151**	1,778,116	− 7	8,928
Unclassified	2,178	125	1,667	98	10,141	2,058	**16,267**	**486,603**	676,396	−22	21,378
Total private	**57,570**	**147,826**	**64,288**	**115,163**	**109,559**	**70,493**	**564,899**	**7,975,788**	**12,451,942**	**−36**	**45,131**
Total Engineering Construction:											
November, 1957 4 weeks	**89,098**	**356,505**	**136,051**	**227,259**	**236,196**	**186,791**	**1,231,900**				**88,910**
October, 1957—5 weeks	104,045	451,299	271,207	293,498	401,797	178,026	**1,699,872**				96,881
November, 1956—4 weeks	85,981	416,165	185,978	366,704	478,623	202,272	**1,735,723**				152,156
Eleven Months 1957	**1,134,972**	**4,152,441**	**2,117,478**	**3,743,200**	**3,222,130**	**2,648,724**		**17,018,945**		**−15**	**1,410,369**
Eleven Months—1956	1,054,184	5,087,100	2,385,600	4,298,891	4,374,856	2,921,118			20,121,749		2,041,957
% Change '56 to '57	+8	−18	−11	−13	−26	−9					**−31**

Labor

Unionists Warned on Job Rights

As Atlantic City convention opens, construction union official says unfair union demands may mean suicide

Members of the United Association of Journeymen and Apprentices of the Plumbing and Pipe Fitting Industry were warned last month that they are cutting their own throats when they subject contractors to unreasonable demands or resort to drastic measures to protect their jurisdiction.

The warning came from the union's President Peter T. Schoemann, who said that most of the UA's locals are using "fair and aggressive" action to protect their charter rights. But a few, he asserted, sometimes engage in a form of jurisdictional suicide that can mean loss of jobs for the entire membership of the association.

In protecting what he called the "vital lifeblood of every craft union," Mr. Schoemann was concerned with two types of jurisdictional problems—conflicts between craft unions, and conflicts between craft and industrial unions.

Both problems are significant items on the Golden Anniversary Convention agenda of the AFL-CIO Building and Construction Trades Department, which is meeting in Atlantic City this week.

At stake in each issue are construction costs and jobs for contractors and construction workers.

Speaking of inter-craft disputes—which involve the question of work assignments—Mr. Schoemann said that "shortsighted selfishness," coupled with failure to utilize the services of the National Joint Board for the Settlement of Jurisdictional Disputes, could permanently impair the UA's jurisdictional rights and increase the "danger" of losing work to nonunion forces.

"More power generating stations and other similar very large projects have been going nonunion in the past 12 months," he said, "than we have seen in the past 10 years. Contractors are simply unable to meet the drastic terms sometimes exacted by our local unions and still obtain these large jobs." By ignoring the Joint Board when a jurisdictional dispute arises, he warned, the union stands a chance of losing jurisdiction by default and may face a "new precedent established for use against us in the future."

In the other field of jurisdiction, according to Mr. Schoemann, the crafts also control their own destiny to some extent. Noting the existence of "severe and aggressive" competition for jobs between the UA and the Oil, Chemical and Atomic Workers Union, Mr. Schoemann made this point: "The wage structure established by this union in oil refineries and other plants is 25 to 40% below the construction wage rates of the United Association. Whenever our local unions force upon our contractors the added burden of these unreasonable demands, they are creating one more reason for the oil companies to do their new construction work directly, using the members of this union, rather than contracting out the work to our own construction firms."

Building trades leaders at the Atlantic City convention are expected to reaffirm the views of Mr. Schoemann. The department seldom has missed a chance to urge greater union and contractor compliance with the National Joint Board machinery.

And in regard to the bigger issue at hand, the convention is expected to serve notice—in one form or another—that it will no longer tolerate loss of jurisdiction to industrial unions (ENR Nov. 28, p. 87) and to consider ways and means of preventing further losses of in-plant construction work.

Hawaiian Strike Fails

Contractor withdraws his complaint with NLRB

McKee Construction Co., principal contractor for the $21 million Capehart housing project at Schofield Barracks, Hawaii, withdrew an unfair labor practice charge filed last week with the National Labor Relations Board.

The withdrawal followed the collapse of a building trades strike when the members of six of 12 unions that were employed on the job ignored picket lines at the request of Richard J. Gray, president of the AFL-CIO Building and Construction Trades Department.

In the charges filed by McKee-Nordic and Meyer, joint contractor on the project, the Honolulu Building and Construction Trades Council and the members of its Executive Committee were accused of setting up a picket line and engaging in a secondary boycott against the contractor, as well as demanding an agreement making the council exclusive bargaining agent for some 200 workers belonging to various unions working on the job.

Picketing occurred early last month and most of the work was shut down. Reason for the strike, which was called by the council, was reported as a dispute over pay for travel time. The council is headed by Arthur Rutledge, a member of the teamsters union and a backer of James Hoffa.

Mr. Gray was in Honolulu when the strike began and asked the men to go back to work. He contended that the strike over travel pay violated existing labor contracts with the contractor. Charles Nichols, international representative of the carpenters union, called the stoppage a "wildcat strike" and challenged Mr. Rutledge's right to hold office.

The failure last week of the strike is seen in Honolulu as a victory for Mr. Gray and a defeat for Arthur A. Rutledge, local union leader.

On Nov. 22 members of the carpenters, laborers, operating engineers, sheet metal workers, bricklayers and iron workers unions had returned to work at Mr. Gray's request. And last week the picketing was called off after the refusal of these six unions to support the strike.

Unionization of construction workers in Hawaii is picking up momentum. Potential membership is in excess of 10,000. And it is unlikely that the building trades will accede to their absorption by the suspended teamsters union.

Wage-wise, Hawaiian construction workers are 20 to 30% below West Coast levels in most categories. Electrical workers, however, recently were assured of wage parity with the average of 100 mainland U.S. cities under a 5-year contract that grants a minimum $1.00 hourly wage increase over the life of the contract.

Teamsters Get a Pay Hike Instead of Pension Fund

Truck drivers who participated in a 90 day strike against the Los Angeles rock, sand and gravel industry in 1955 will receive a pay raise instead of the independent pension plan they were awarded by arbitration in early September (ENR Sept. 12, p. 150).

Trustees of the Western Conference of Teamsters' pension plan, which was rejected by the arbitrator, have refused to enter into a reciprocal arrangement with trustees of the independent plan.

(*Continued on page 178*)

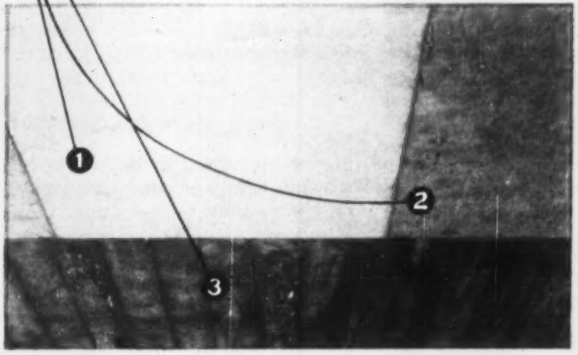
3 reasons why PLYGLAZE® high-density* overlaid plywood outperforms any form material on the market

1. FORMS SMOOTHER CONCRETE

Hard, glossy-smooth fused resin-fiber surfaces form flawlessly smooth concrete, with no trace of grain pattern. Unretouched photo shows marked difference in appearance quality of concrete cast against PlyGlaze, ordinary plywood and shiplap.

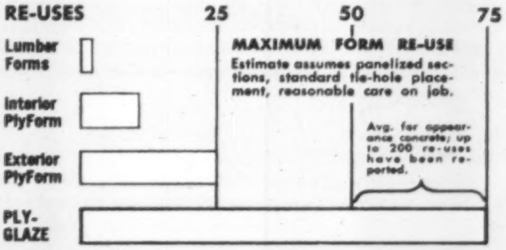
RELATIVE APPEARANCE OF CONCRETE

	Up to 50% of Max. Re-Use	Up to 100% of Max. Re-Use	Where to Use
1. PLYGLAZE	Excellent	Good	For smoothest concrete, maximum re-uses
2. PLYFORM	Good to Fair	Fair to Poor	For fairly smooth concrete, multiple re-uses
3. LUMBER	Poor	Very Poor	Where appearance and re-use not important



2. GIVES MANY MORE RE-USES

PlyGlaze's tough, hard surface stands up under hundreds of pours. With reasonable care, you'll easily get 50 to 75 re-uses. Actually over 200 have been obtained—and even then PlyGlaze continued to form good looking concrete.



3. HELPS CUT COSTS TWO WAYS

A. TIME & LABOR SAVINGS—Sharply reduces rubbing and finishing labor. Ceiling slabs can be painted direct, eliminating expensive plastering. PlyGlaze also cuts form construction, erection and stripping time. High re-use factor eliminates form reconstruction during job.

B. LOW COST PER USE—Even when cost is sole criterion, greater number of PlyGlaze re-uses frequently more than make up for higher initial cost, particularly where costs can be amortized over 25 or more pours.

COST PER-SQUARE-FOOT-PER-USE

No. Re-Uses ➤	1	10	25	50	100	200
PLYGLAZE	$0.375	.038	.015	.008	.004	.002
Exterior PLYFORM	.234	.023	.009	Gives Max. 25 Re-Uses		
Interior PLYFORM	.218	.022	Gives Maximum 10-12 Re-Uses			
LUMBER	.110	Gives Maximum 2-3 Re-Uses				

Estimates based on 30 month average for prices quoted by St. Paul & Tacoma for following material delivered in Chicago: ¾" PlyGlaze; ¾" Ext. & Int. PlyForm, mill oiled, edge sealed; 2 & btr. 1" green Douglas fir or hemlock.

POINTS IN BRIEF

- Has the strength, workability and adaptability of ordinary plywood.
- Strips easily; the non-absorbent surfaces will not stick to the concrete.
- No oiling is needed between the pours other than to facilitate cleaning.
- Overlay will not soften or come loose. Unharmed by alkaline reaction.
- Overlay minimizes moisture pickup and the resultant loss of rigidity.

Hard, glossy, translucent high density* fused-resin fiber overlay bonded to both sides of panel. Resin content controlled to give exact amount of hardness and wear resistance required for form work.

Base panel is top quality DFPA-Inspected solid core Exterior fir plywood. Available in all standard sizes, thicknesses.

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*HIGH DENSITY (glossy, translucent overlay) is special concrete form panel. MEDIUM DENSITY overlay (opaque with texture similar to drawing paper) is paint grade; not for form work.

Terms of the arbitration award provided that the independent plan would not become effective unless agreement was reached on a reciprocity clause. Purpose of the clause would have been to enable employees transferring to an employer operating under the other plan to take their pension rights with them.

As a result of the WCT refusal, the drivers will receive a pay increase of 10 cents an hour, retroactive to July 1, in lieu of the pension contribution.

In addition, the employers have agreed voluntarily to pay the truckers an extra 5 cents an hour retroactive to Oct. 1, and another 6 cents an hour next April 1, to bring them up to the same scales recently granted employees who belong to the operating engineers union.

Group Bargaining

Contractors' association is loser in "whipsawing" suit

A suit by a group of Denver contractors complaining of "whipsawing" action in collective bargaining and asking $110,000 in damages from eight officers of Denver Local 9 of the Sheet Metal Workers' International Association has been dismissed in Denver District Court.

The contractors had charged the union officials with fraud and breach of an agreement in negotiating a labor contract last June.

The suit alleged that under the agreement the union had promised that it would bargain exclusively with the association and that it would not bargain with any individual contractor. The contractor group is the Sheet Metal & Warm Air Heating Contractors Association of Denver.

Despite its promise, the contractors said, the union negotiated individual contracts with two companies, thereby causing the association to suffer $60,000 in damages. Judge William Black dismissed this cause of action on the grounds that the agreement was in conflict with the Colorado Labor Peace Act. "The association entered into an agreement purporting to exclude third persons from negotiating with the defendant union," he said. "This is contrary to public policy."

As its second cause of action, on which a $50,000 damage claim was based, the association charged that after the individual contracts were signed the association was forced to sign similar contracts with the union. It was claimed that in the association contract, however, the union had fraudulently added a wage rate provision not in the two individual agreements.

In dismissing this cause of action, the court held that since the association did not seek to set aside the contract—but is standing by it—it cannot ask redress for damages and must be ruled to have waived its claim of fraud.

Organizing Ordinance Before Supreme Court

A Baxley, Ga., ordinance requiring the licensing of union organizers is now before the U. S. Supreme Court. Principal question that emerged from the oral arguments is whether the measure is an unlawful discrimination against organized labor.

Heavily criticized by the AFL-CIO, including the building trades unions, the ordinance requires organizers soliciting members for any organization to obtain a permit at an annual cost of $2,000 and imposes a fee of $500 for every dues paying member obtained by the organizer.

The ordinance is not unique and represents one of labor's biggest roadblocks to extending unionization in the South. Building Trades President Richard Gray has viewed ordinances of the Baxley type as part of an open shop campaign to weaken and destroy unions. On one occasion he said they typify the "forces that are opposing us."

In the case before the Supreme Court, union attorneys are contending that the law is discriminatory and violates the constitutional provision which guarantees equal protection of law. Passed in 1949, the ordinance has never been applied to any organization except a labor union.

The unions also claim the measure violates the free speech and assembly provisions of the Constitution, and nullifies the right to self organization guaranteed employees by the Taft-Hartley Act.

Genesis of the present case was the arrest of two union organizers who failed to obtain a permit.

State Labor Groups Head Right-to-Work Opposition

Organized labor in Ohio will appoint a 12 man committee to coordinate opposition to a proposal for a referendum on right-to-work legislation.

According to spokesmen for the Ohio State Federation of Labor, Ohio CIO Council, United Mine Workers and the Railroad Brotherhoods, the committee also will direct the battle against other proposals adversely affecting the labor movement.

The Ohio Chamber of Commerce and other groups are planning to have the right-to-work issue submitted to state voters next November. If the proposal is approved, it will mean another state right-to-work law making it illegal for labor and management to negotiate union shop agreements.

One of the grounds on which labor defends the union shop is that a person who benefits from a union should help support it by joining and paying dues.

Opponents contend that membership in a union should not be a condition of employment.

Local Labor Group Offers A Forum on Jurisdiction

Union leaders in Delaware have set up an industrial union department in the newly formed Delaware State Labor Council. In addition to its other functions the department will attempt, on request, to lend its assistance in settling jurisdictional disputes that may arise between the building trades and industrial unions.

The jurisdictional conflict between the two groups is one of the AFL-CIO's most critical problems (ENR Nov. 28, p. 87) and is one of the toughest items on the labor convention agendas in Atlantic City this week.

The new department in the Delaware state labor organization will serve as a clearing house for disseminating information on industry-wide bargaining, on organizing unions on an industry-wide basis, on safety programs and on community services and political action.

Labor Briefs . . .

• **Safety**—The Executive Board of the San Francisco Building and Construction Trades Council has adopted a resolution recommending that the council establish a course for all members of affiliated building trades unions on the use and safe handling of power tools used in the construction industry.

• **Exploration**—As part of an effort to end exploitation by sweatshop employers, Local 3 of the International Brotherhood of Electrical Workers in New York City will no longer collect its $2.50 monthly dues from members earning less than $1.25 an hour. Affected are 1,000 members who will continue to receive all standard union benefits.

• **Right-to-work**—The San Francisco Building and Construction Trades Council and the District Council of Carpenters are considering appointment of special committees to conduct campaigns to "educate" members of their affiliates in an effort to block current right-to-work proposals.

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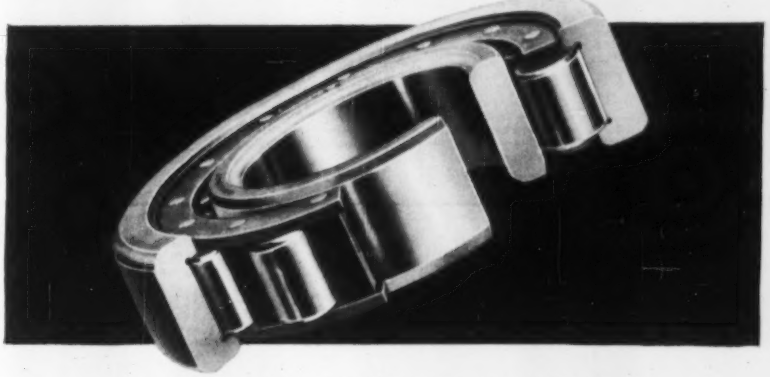

Cutaway view of Rollway Tru-Rol® segmented-retainer roller bearing . . . one of three distinct types of Tru-Rol bearings available.

True, there's a wide difference in quality and cost between the low-range and high-range of any "commercial grade" bearing. But every Rollway Tru-Rol "commercial grade" bearing approximates as closely as possible maximum standards of construction consistent with the price.

Take the matter of separators, for example: In Rollway bearings, separators give maximum guidance to each roller. The result is greater total load capacity and longer life.

Equal spacing of rollers means uniform distribution of load. The result is the elimination of destructive "pulse" and vibration.

Moreover, separators are of deep section, formed to the curve of the rollers, giving true axial alignment, smooth-surface contact and an even lubrication film on each roller.

It's little things like these that mount up to big savings in service. Check the accompanying list, or ask a nearby Rollway Service Engineer to explain in detail the quality you should be getting in your "commercial grade" bearings. No cost. No obligation. Just write us. Rollway Bearing Co., Inc., 586 Seymour St., Syracuse, N. Y., *manufacturers of a complete line of radial and thrust cylindrical roller bearings.*

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☐ Is the retainer roller-supported, to reduce sliding friction?

Retainer Construction

☐ Is the retainer strong enough to withstand shock loads and sudden reversals?

(A Rollway segmented-type steel retainer, such as that illustrated, is the strongest, most durable available in commercial grade bearings.)

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☐ Are all rollers equally separated, or do some rub against each other in opposed-motion friction?

☐ Are rollers distributed evenly to prevent "pulse" and vibration?

Roller Construction

☐ Are the rollers crowned for optimum load distribution?

For Top Quality in Every Detail Buy Tru-Rol and Be Sure!

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ROLLER BEARINGS

OFFICIAL PROPOSALS

Bids: December 12, 1957

Soil Explorations and Foundation Investigations

CAMPUS SITE DEVELOPMENT AREA
WASHINGTON AVENUE, ALBANY
ALBANY COUNTY
Spec. No. SM-111

NOTICE TO BIDDERS

Sealed proposals for the above project, in accordance with Specification No. SM-111, will be received by Henry A. Cohen, Director, Bureau of Contracts, Department of Public Works, 14th Floor, The Governor Alfred E. Smith State Office Building, Albany, N. Y., on behalf of the Department of Public Works, until 2:00 o'clock P.M., December 12, 1957, when they will be publicly opened and read.

Each proposal must be made upon the form and submitted in the envelope provided therefor and shall be accompanied by a certified check made payable to the State of New York, Commissioner of Taxation and Finance, of 5% of the amount of the bid as a guaranty that the bidder will enter into the contract if it be awarded to him. The specification number must be written on the front of the envelope. The blank spaces in the proposal must be filled in, and no change shall be made in the phraseology of the proposal. Proposals that carry any omissions, erasures, alterations or additions may be rejected as informal.

The State reserves the right to reject any or all bids. Successful bidder will be required to give a bond conditioned for the faithful performance of the contract and a separate bond for the payment of laborers and materialmen, each bond in the sum of 100% of the amount of the contract. Corporations submitting proposals shall be authorized to do business in the State of New York. Specifications may be examined free of charge at the following offices:

(a) Bureau of Contracts, 14th Floor, The Governor Alfred E. Smith State Office Building, Albany 1, New York.

(b) Mr. G. L. Nickerson, District Engineer, New York State Dept. of Public Works, 353 Broadway, Albany, New York.

(c) Mr. William M. Trainer, Associate Contract Engineer, Department of Public Works, 270 Broadway, New York City, New York.

Specifications may be obtained by calling at the offices of any one of the above and making deposit of $5.00 for each set or by mailing such deposit to the Bureau of Contracts, Department of Public Works, The Governor Alfred E. Smith State Office Building, Albany, N. Y. Checks shall be made payable to the Department of Public Works. Proposal blanks and envelopes will be furnished without charge.

Dated: November 15, 1957.

U. S. Government

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Specifications No. DC-4999) will be received at Stockton, Kansas until January 7, 1958, for furnishing labor and materials for earthwork and structures, Osborne Canal, Webster Unit, Kansas, Missouri River Basin Project. Location west of Osborne, Kansas. Principal items are 540,000 cu. yds. excavation; 46,000 cu. yds. earth lining for canal; 400 cu. yds. concrete; 1,990 lin. ft. concrete pipe, 42- to 72-inch; and other work. Completion time 330 days. For particulars, address Bureau of Reclamation, P. O. Box 841, Stockton, Kansas; or Building 53, Denver Federal Center, Denver 2, Colorado. W. A. Dexheimer, Commissioner.

DEPARTMENT OF THE INTERIOR, Bureau of Reclamation. Sealed bids (Invitation No. DS-4998), SET ASIDE FOR SMALL BUSINESS, will be received at Denver, Colorado, until January 7, 1958, for furnishing four high-pressure 5- by 5-foot gate valves for outlet works for Fort Cobb Dam, Washita Basin Project, Oklahoma. Delivery is desired within 180 days. For particulars, address Bureau of Reclamation, Building 53, Denver Federal Center, Colorado. W. A. Dexheimer, Commissioner.

Bids: December 12, 1957

Two Concrete Block Groins Sound View Beach

NOTICE TO CONTRACTORS

STATE DEPARTMENT OF PUBLIC WORKS, ALBANY, N. Y.—Pursuant to the provisions of the Public Building Law and Highway Law, sealed proposals will be received, until 10:30 A.M., December 12, 1957 by Henry A. Cohen, Director, Bureau of Contracts, 14th Floor, the Governor Alfred E. Smith State Office Building, Albany, N. Y. for:

Contract B.P. 57-60 for
Two Concrete Block Groins,
Sound View Beach, Town of
Southold, Suffolk County, N. Y.

Maps, plans and specifications may be examined and obtained at the following offices:

(a) Bureau of Contracts, 14th Floor, The Gov. Alfred E. Smith State Office Bldg., Albany, New York.

(b) Department of Public Works, 270 Broadway, New York City, N. Y.

(c) In addition to the above mentioned offices, plans, maps and specifications for Contract B.P. 57-60 may be examined and obtained at the office of Mr. Milton E. Goul, 325 W. Main Street, Babylon, L. I., New York.

The deposit for Plans and Proposal Forms for contract B.P. 57-60 is $10.00. A refund in full will be made to bidders for return of one set in good condition within 30 days of award or rejection of bids; refund for all other sets in good condition, similar period, will be 50% of deposit. The Engineer's Estimate of Cost for Contract B.P. 57-60 is $57,000.00.

Proposals for Contract B.P. 57-60 must be submitted in a separate sealed envelope with the name and number of the contract plainly endorsed on the outside of the envelope. Each proposal must be accompanied by draft or certified check, payable to the order of the State of New York, Commissioner of Taxation and Finance for the sum of $3,000.00. The retention and disposal of the bidding check, the execution of the contract and bonds shall conform to the provisions of the Public Building Law and to the Highway Law as set forth in "Instructions to Bidders" in the contract specifications.

The right is reserved to reject any or all bids.

JOHN W. JOHNSON
SUPT. OF PUBLIC WORKS

U. S. Government

United States Department of Commerce, Bureau of Public Roads, November 21, 1957. SEALED BIDS will be received at the office of the Inter-American Highway Division, Bureau of Public Roads, Room 6029, General Services Building, Washington 25, D. C., until 2:00 p.m., E.S.T., December 19, 1957, for the construction of Honduras Project 56-1(A) on the Inter-American Highway in the Republic of Honduras. The project consists of grading, drainage, special sub-base, bridges and other work between the El Salvador and Nicaragua borders. Bidders will be limited to United States or Honduras firms with a satisfactory record of performance on highway construction in the United States of America or in the Republic of Honduras. The approximate quantities of the major items of work are: 106 Hectares Clearing and Grubbing 472,600 cubic meters Unclassified Excavation, 151,000 cubic meters Borrow Excavation, 236,700 cubic meters Special Sub-base, 51 kilometers Finishing Roadbed Previously constructed, 7310 cubic yards Class "A" Concrete, 1,096,000 lbs. Reinforcing Steel, 662,120 lbs. structural steel (Erect only), 9430 cubic yards Excavation for Structures (Bridges), 11,700 linear feet Nestable Bituminous Coated Corrugated Metal Culvert Pipe (from 18" to 60"), One set of Plans, Specifications and Proposal Forms will be furnished free to prospective bidders upon request at the address given above, or at the Inter-American Highway District Office, Bureau of Public Roads, 209 Capitalizadora 4-A Avenida Colon, Tegucigalpa, Honduras. Additional sets of plans may be purchased for $50.00. C. D. Curtiss, Commissioner

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Bids: January 6, 1958

Newport News Waterworks Commission City of Newport News, Virginia

CONSTRUCTION OF
ADDITIONS TO HARWOOD'S MILL
FILTRATION PLANT
GENERAL CONTRACT
ELECTRICAL WORK

Sealed proposals for construction of additions to the Harwood's Mill Filtration Plant will be received by the Newport News Waterworks Commission of the City of Newport News, Virginia, at its office in the City Hall until 2:00 p.m. on January 6, 1958 and then publicly opened and read.

The work is divided into two contracts:

General Contract

Electrical Work

The work under the general contract includes furnishing all labor, tools, equipment and other items necessary to modify existing structures and appurtenances and to provide new structures and appurtenances required to increase the nominal capacity of the existing plant from 6 mgd to 12 mgd.

The work under the electrical contract includes a new incoming line, modifications to existing control panel, new stepdown transformer, power and lighting panel boards, wiring and controls and miscellaneous changes in existing electrical work.

Each proposal shall be on the forms furnished and shall be accompanied by a certified check in the amount of 10 per cent of the amount of the bid, payable to the order of the City of Newport News, Virginia.

The successful bidder at the time of the execution of the contract must deposit with the City Auditor an approved surety bond in an amount equal to the amount of the contract award.

Plans, specifications, proposal forms and other contract documents may be examined and obtained at the office of the General Manager, Newport News Waterworks Commission, City Hall, Newport News, Virginia, or at the office of Malcolm Pirnie Engineers, 25 West 43rd Street, New York 36, New York.

A charge of Forty Dollars ($40.00) per set will be made for the general contract and Twenty-Five Dollars ($25.00) for the electrical work contract, which charges will be refunded to bidders on return of the documents in good condition. Non-bidders will receive a refund of Twenty Dollars ($20.00) per set for the general contract and Fifteen Dollars ($15.00) per set for the electrical work on return of documents in good condition within 10 days after receipt of bids.

The City reserves the right to reject any or all proposals and to accept any bid deemed to be for its best interest.

CITY OF NEWPORT NEWS,
VIRGINIA
NEWPORT NEWS WATERWORKS
COMMISSION
W. B. Harman, General Manager

OFFICIAL PROPOSAL

RATE: $2.10 per line (or fraction) per insertion.

CLOSING DATE: 10:30 a.m. Friday for issue out following Thursday.

SEND COPY: Official Proposal Division, Engineering News-Record, Class. Adv. Div., P.O. Box 12, New York 36, N. Y.

OFFICIAL PROPOSALS

Bids: December 21, 1957

Sewage Treatment Project of the Municipal Authority of the Borough of Baden Beaver County, Pennsylvania

Sealed proposals will be received at the office of the Secretary of Baden Borough, Municipal Building, Baden Borough, Beaver County, Pennsylvania until 10:00 A.M., E.S.T., December 21, 1957, and will be publicly opened and read shortly thereafter in the Borough Council Room, for furnishing all necessary labor, material and equipment and performing all work for the work noted below.

Proposals will be received for five (5) separate parts of the project as hereinafter indicated. Each proposal shall be accompanied by a certified check payable to the Municipal Authority of the Borough of Baden or a bid bond in an amount not less than ten (10) per cent of the total bid in accordance with the provisions of the Contract Documents.

Copies of the Contract Documents including the Drawings and Specifications will be on file for inspection purposes at the offices of Gannett Fleming Corddry and Carpenter, Inc., 5823 Penn Avenue, Pittsburgh 6, Pennsylvania, and 600 North Second Street, Harrisburg, Pennsylvania, and also at the office of the Secretary of Baden Borough in the Municipal Building, Baden Borough, Beaver County, Pennsylvania.

Copies of the Contract Documents, including Drawings and Specifications, not to exceed two (2) sets of any particular Contract to a prospective bidder, may be obtained only from the office of Gannett Fleming Corddry and Carpenter, Inc., that is located at 5823 Penn Ave., Pittsburgh, Pa. (P. O. Box 5073, Pittsburgh 6, Pa.), upon deposit of the following stated amounts for each set:

Contract One CONSTRUCTION OF INTERCEPTOR AND OUTFALL SEWER	$25.00
Contract Two GENERAL CONSTRUCTION OF A SEWAGE TREATMENT PLANT	$25.00
Contract Three PLUMBING WORK IN CONNECTION WITH CONSTRUCTION OF A SEWAGE TREATMENT PLANT	$20.00
Contract Four HEATING WORK IN CONNECTION WITH CONSTRUCTION OF A SEWAGE TREATMENT PLANT	$20.00
Contract Five ELECTRICAL WORK IN CONNECTION WITH CONSTRUCTION OF A SEWAGE TREATMENT PLANT	$20.00

Full refund will be made only to actual bidders on the five (5) contracts noted above, for return of one (1), no more, of each set in good condition within fifteen (15) calendar days after closing date for receipt of bids; refund for return of all other sets, in good condition, within the same period, will be fifty (50) per cent of the deposit.

MUNICIPAL AUTHORITY OF THE BOROUGH OF BADEN
Baden Borough
Beaver County, Pennsylvania

Gannett Fleming Corddry and
Carpenter, Inc., Engineers,
5823 Penn Ave.,
Post Office Box 5073
Pittsburgh 6, Pennsylvania

EMPLOYMENT OPPORTUNITIES

—RATES—

DISPLAYED

The advertising rate is $31.80 per inch for all advertising appearing on other than a contract basis. Frequency rates quoted on request.

An advertising inch is measured 7/8" vertically on a column—3 columns—30 inches to a page.

Subject to Agency Commission.

NATIONAL
COVERAGE

UNDISPLAYED

$2.10 per line, minimum 3 lines. To figure advance payment count 5 average words as a line.

Position Wanted ads take 1/3 of above rate.

Box Numbers—count as 1 line.

Discount of 10% if full payment is made in advance for 4 consecutive insertions.

Not subject to Agency Commission.

Send NEW ADS and Inquiries to Classified Advertising Division of ENGINEERING NEWS-RECORD
P. O. Box 12, N. Y. 36. December 19th issue closes December 9th

REPLIES (Box No.): Address to office nearest you
c/o This publication Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

POSITIONS VACANT

Superintendent experienced in heavy sewer & water main construction under difficult conditions, by N. Y. State Contractor. Permanent position for qualified, responsible person looking for advancement with established firm. P-6165, Engineering News-Record.

Heavy contractor, N. Y. State, needs man to assume charge of take off, purchasing, engineering, expediting. Requires sound background & responsible field experience in heavier water, sewer & treatment plant work. Excellent opportunity for qualified person seeking & able to advance. Reply to P. O. Box 147, Colvin Station, Syracuse, N. Y.

Soils Engineer with civil degree and at least 15 years' experience to join construction supervisory staff of a large, long established company with extensive long-range expansion program. Successful applicant will supervise placement and inspection of graded material in rock fill earth core dam 300 ft. high. Preliminary work starting now and completion scheduled June 1961 with other projects in a ten-year program following. Applicant must furnish resume of experience with references relating to soils experience. Qualified applicant must pass physical exam similar to insurance exam at Company expense. Location in Southeast. Salary open. P-6607, Engineering News-Record.

Civil Engineer for Public Works Department of northern New Jersey suburban municipality for surveys and construction field and office. Good opportunity, excellent benefits and working conditions. State education, experience and salary requirement. P-6659, Engineering News-Record.

Superintendent experienced in concrete dam construction both arch and gravity. Permanent position for qualified responsible person with established Colorado company. Only qualified persons apply. P-6640, Engineering News-Record.

POSITIONS VACANT

Wanted: Electrical Engineer—Experienced in Power Plant Design. Capable of assuming charge of new department in expanding Midwest engineering firm. Possibility of affiliation to responsible party. Indicate availability. P-6686, Engineering News-Record.

Executive Director to carry out public relations and administrative duties for 69 year old Iowa Engineering Society. Engineering background preferred. Salary open depending upon qualifications. Inquire with resume 418 Hubbell Building, Des Moines 9, Iowa.

Wanted: Construction Contracts Manager. Must be ambitious, aggressive man with experience in industrial construction. Not a routine "9 to 5" position. Top Salary to qualified individual, as executive in growing division of established firm with current projects in Midwest and on East Coast. P-6556, Engineering News-Record.

Park Engineer C.E. grad under 50 for outstanding park system in large city in midwest.—Experienced preferred—At least 3 yrs. as dep't head or administr. engineering in major park development—county or state highways—bridges—roads. City or consulting engineering on municipal improvements. Salary in five figures plus benefits. P-6736, Engineering News-Record.

Construction Manager, preferably in 40's and with overseas experience, for concrete housing construction in Middle East. Duration approximately three (3) years. American firm. Tact and ability negotiate, organize and supervise essential. Salary open. P-6741, Engineering News-Record.

Civil Engineers: Unlimited opportunity with Rochester, N. Y. consulting firm. Excellent salary. P-6742, Engineering News-Record.

Estimator, for quantity survey, recaps, job analysis, some pricing in General Construction. Engineering and/or field experience desirable. Send resume, state age and salary range. R. S. Noonan, Inc., 26 North Duke Street, York, Pennsylvania.

Experienced in piers, docks, bridges and associated water construction. Submit resume of experience education and starting salary desired. P-6743, Engineering News-Record.

POSITIONS VACANT

Experienced Estimator—General Contractor, commercial, industrial, civic and school construction, $100,000 and over, New Hampshire Civil Engineer or equivalent. Send resume of education, experience and salary required to P-6722, Engineering News-Record.

Senior Soils and Materials Engineer—Foreign —Minimum 6 years experience in highway construction materials survey and testing. Must be able to take responsible charge of field laboratory and testing operations. Near East Country. Minimum 2 year contract. P-6733, Engineering News-Record.

Chief of Surveys—Location Engineer—Foreign—Minimum 8 years experience in highway and bridge location surveys with at least 2 years in responsible charge of survey work. Must have good knowledge of highway location operations—Near East Country. Minimum 2 year contract. P-6738, Engineering News-Record.

Design Engineer with trailer experience for fabricating shop. Permanent position, attractive salary, other company benefits. Anderson-Dunham, Inc., P. O. box 131, Minden, La.

EMPLOYMENT SERVICE

Salaried personnel, $5,000-$30,000. This confidential service, established 1929, is geared to needs of high grade men who seek a change of connection under conditions assuring, if employed, full protection to present position. Send name and address only for details. Personal consultation invited. Jira Thayer Jennings, Dept. L., P. O. Box 674, Manchester, Vermont.

POSITIONS WANTED

General Superintendent, 27 yrs. experience in all phases of Earth Moving Construction projects, especially Heavy Rock Work. Engineering background, Estimating experience, have large following competent skilled men. Available at once, will locate anywhere. PW-6611, Engineering News-Record.

(Continued on page 183)

HIGHWAY ENGINEERS

SURVEY — DESIGN — STRUCTURAL

Offices

South Bend, Ind. East Lansing, Mich. Wheeling, Ill.

Benefits

Company pays Hospital Insurance, including dependents, vacations, Profit-Sharing-Retirement Plan. Low Personnel turnover. Salary advancement periodically with your advancement in ability.

CHAS. W. COLE & SON

220 W. LaSalle Ave. South Bend, Ind.

Mechanical Design Engineers

The Eimco Corporation, a rapidly expanding construction tractor and mine loader manufacturer, seeks engineers to assume responsibility for design and development of heavy mechanical equipment for mining and materials handling. Permanent positions. Company benefits.

If you are qualified by education and experience, we invite you to contact:

Personnel Director,
The Eimco Corporation,
P. O. Box 300,
Salt Lake City, 10, Utah.

CIVIL ENGINEERS

Civil Engineers with experience in hydraulics, concrete, soils or specifications for design hydraulic structures in Harrisburg, Pennsylvania. Graduate Civil Engineers also required for Chief, Construction Branch and Resident Engineers on Dam Construction. Salary open. State experience, salary requirements and references.

P-6428, Engineering News-Record
Class. Adv. Div., P. O. Box 12, N. Y. 36, N. Y.

ENGINEERS DESIGNERS

McKee has permanent openings at their Cleveland, Ohio, offices for men with at least 3 years' experience in any of the following:

Oil Refineries
Blast Furnaces
Steel Mills
Industrial Plants

In the following categories:

Piping Checkers
Process Piping
Piping Layout
Concrete
Structural
Electrical
Mechanical
Pressure Vessel
Mechanical Equipment
Specifications
Instrumentation
Estimators

Broad diversification of work in our 3 engineering divisions assures you security of employment.

Send detailed resume to
G. VICTOR HOPKINS

ARTHUR G. McKEE & CO.
2300 Chester Ave., Cleveland 1, Ohio

General Sales Manager

NORTHERN CALIFORNIA

A newly created position managing the world wide sale of our engineering construction services offers a challenging opportunity with high level responsibility for a man with the following qualifications:

Specifically, we seek a person between ages 35-45 to exploit business opportunities in new industries. He must be well-versed in executive selling and contract negotiations, and should be highly familiar with the general engineering construction field. He will be responsible for sales promotion and advertising, improving upon current sales activities, and the general coordination of the efforts of sales engineers. He reports directly to the General Manager. Salary is open.

We are a growing company headquartered in Northern California, engaged in the non-defense manufacture of pilot plants, heavy machinery, and related products. Our past performance and projected expansion of both operations and facilities represents well our interest in further growth and development.

In first reply, please include information regarding age, experience, compensation, and education. All replies confidential.

P-6592, Engineering News-Record
68 Post St., San Francesco 4, Calif.

TRANSIT DIVISION CHIEF

CITY OF PHILADELPHIA—Attractive administrative professional engineering position available for qualified man capable of handling responsibility involved in planning, directing, and coordinating transit design, construction, and operation. Includes development of long-range policies and programs for extensive improvements and extensions to rapid transit systems.

Engineering degree and ten years of progressively responsible experience in planning, design, and construction of transit facilities, including experience in responsible administrative capacity, experience in the operation of transit system, and experience in supervision of construction contracts is desirable. Any combination of experience and training approximating this will be considered.

Send complete resume and salary requirements. All replies confidential.

Commissioner S. B. Regalbuto
Dept. of Public Property
Room 1303 City Hall Annex
Philadelphia 7, Pa.

CIVIL ENGINEER

Young civil engineer interested in broad application of civil engineering.

Excellent opportunity with consulting firm. Liberal benefit plans and good working conditions. Location Middle West.

Send resume of education and experience with salary requirements to:

P-8223, Engineering News-Record
520 No. Michigan Ave., Chicago 11, Ill.

ELECTRICAL ENGINEER

Electrical Engineer, preferably with hydroelectric plant background, to be responsible for all electrical installations in large hydroelectric plant located in the Pacific Northwest. State education, chronological experience and salary record, salary expected, reference and when available.

P-6583, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

Your inquiry

will have

Special value . . .

If you mention this magazine, when writing advertisers. Naturally, the publisher will appreciate it . . . but, more important, it will identify you as one of the men the advertisers wants to reach with this message . . . and help to make possible enlarged future service to you as a reader.

EXPERIENCED HYDRAULICS ENGINEER WANTED

Graduate engineer experienced in paper mill hydraulics, planning and development of piping layout systems, etc. for large expanding and progressive mill in Maryland. Good salary, all benefits and excellent opportunity for advancement. Send detailed resume of experience and education to

Director of Personnel
West Virginia Pulp & Paper Company
Luke, Maryland

ASSISTANT TOWN ENGINEER

Graduate C.E. for permanent position with Public Works Department, preferably with some experience in construction, inspection and surveying for roadways and drainage systems. Starting salary up to $6,000. Vacation and Retirement System. For details write **A. Walter Saburn, Assistant Superintendent of Public Works, Town of Darien, Connecticut**

Positions Available for EXPERIENCED MEN as Bridge Designers, Detailers & Draftsmen

HOWARD, NEEDLES, TAMMEN & BERGENDOFF
RM. 1146—80 BOYLSTON ST.
BOSTON, MASS.

BRIDGE DESIGNERS STRUCTURAL ENGINEERS

We have career positions open for structures men in the uncrowded, colorful West! Professional recognition, advancement, security and fringe benefits. Hunt, fish, work, live and enjoy life in Wonderful Wyoming! Starting salaries from $5100 to $7000 per annum. You may qualify! Write for details:

Personnel Director
Wyoming Highway Department
Box 931
Cheyenne, Wyoming

EQUIPMENT MAINTENANCE SUPERINTENDENT

A challenging oportunity is open to the properly qualified man with one of the largest highway and heavy-duty off-highway fleets in the country. The man we are looking for should be prepared to take complete charge of a large repair and preventive maintenance shop and handle all labor and vendor relations connected thereto. Salary is open and will be geared to experience and performance. Write, giving job and personal history particulars.

P-6709, Engineering News-Record
520 N. Michigan Ave., Chicago 11, Ill.

EMPLOYMENT ABROAD FOR ENGINEERS

The Government of Iraq, is desirous of employing an authorized engineer, specialized in construction of roads, buildings and drainage system for the period of two years, subject to renewals.

For detailed information please apply at the **CONSULATE GENERAL of IRAQ, 14 East 79th Street, New York City.**

Consul General of Iraq.

STRUCTURAL STEEL CONTRACT ENGINEER OR ESTIMATOR

MARINE EXPERIENCE HELPFUL

SEABOARD STRUCTURAL STEEL
P. O. Box 950, Wilmington, Delaware

SENIOR HIGHWAY ENGINEER

(Foundations)

Civil Engineering degree and 6 years experience including 2 years as a supervisor. Salary Range: $5940-$8340 per year.

Write Glendon A. Scoboria
State Personnel Director, Room 405
State Office Building, Hartford, Connecticut

POSITIONS WANTED

(Continued from page 181)

Construction Supt.—C.E. 36, 13 years experience in all types multi-million dollars construction, foreign and domestic. German, French, Portuguese, Spanish. Seeking a permanent assignment or plant maintenance considered. PW-6669, Engineering News-Record.

Tunnel Gen. Supt., 49. Available Jan. 1. 27 yrs. supervising some of worlds largest underground powerhouses, shafts, cassions, penstocks. Concreting same. Hard rock, soft ground. I get Progress. Help Estimate. Resume on request. PW-6662, Engineering News-Record.

Construction Executive, 42, twenty years experience. All phases Industrial, Commercial, Institutional, Military, Shipyard, and Heavy Construction. Bids to completion. Graduate Construction Management; Contract Negotiation; Supervision; Public and Labor Relations; Cost analysis; Estimating and Quantity Survey. Desire permanent connection with possible future participation. Central New Jersey or Eastern Pennsylvania. Minimum $15,000.00. Available after January 1, 1958. Certain Key personnel available with me. PW-6689, Engineering News-Record.

Structural Engineer BS, MS in CE, age 35, bridge design experience with internationally known U. S. consulting firms, available for either western U. S. or preferably foreign assignment after January 1958. Familiar with structural design of hydraulic structures. PW-6676, Engineering News-Record.

Bridge Superintendent—available with 15 years of Bridge Construction experience. Do own layout, instrument work, quantity take-off and job planning and supervision. PW-6675, Engineering News-Record.

Engineer desires work with large contractor. Ends 3 years service March 30, married, 26, has B.S.C.E. degree from R.P.I. with 1 year of experience and commercial pilots license. Write before Dec. 15 to Ken Negus Jr., 57 Scott Cir., Waco, Texas.

POSITIONS WANTED

Structural Engineer, 30 years exp. des. sewage treatment and water filtration plants, bridges, buildings. PW-6693, Engineering News-Record.

Civil Engineer-Attorney, Age 35, 5 yrs. experience in office and field construction, 2 years experience as civilian Attorney with Corps of Engineers, commercial pilot with instrument rating. Desire executive position with Contractor or Engineering Firm. PW-6698, Engineering News-Record.

Paving Engineer BSCE, MSCE with 20 years experience, single, desires position for overseas or local airport or highway projects. Resume and references available upon request. PW-6734, Engineering News-Record.

Civil Engineer—MSCE—Applied hydraulics and theoretical fluid mechanics. Veteran. PW-6727, Engineering News-Record.

Construction Est. or Manager-Singular right hand man, 25 years Bldg. Const. background. PW-6754, Engineering News-Record.

Civil Engineer, 1st Hons B.Sc., M.Sc. structural. Top of class, seeks academic position. 1 year lecturing experience, 3 years construction and design; powerhouses; concrete and steel structures. PW-6757, Engineering News-Record.

Chief Estimator—heavy const. P. E. 38. Bridges, highways, tunnels, sewage plants, waterfront, piles, excavation & concrete. N.Y.C. L. I., or Westchester vic. PW-6752, Engineering News-Record.

Reg. engr. 32, 8 yrs. struct. design and field, p.g. work prestressed conc., desires pos. prestressed conc. design or sales. East Coast. PW-6756, Engineering News-Record.

Manager or General Superintendent. Age 42. 26 years experience in all types of pile foundations, land and water cofferdams, bulkheads, piers and docks, underpinning, heavy timber and concrete construction and underwater work. Prefer to work out of the country. Presently general mgr. of above type of work. Available after 1st of year. Best of references. PW-6758, Engineering News-Record.

SEARCHLIGHT SECTION

(Classified Advertising)

BUSINESS OPPORTUNITIES — **EQUIPMENT USED or RESALE**

DISPLAYED ———***RATES***——— ***UNDISPLAYED***

The advertising rate is $23.60 per inch for all advertising appearing on other than a contract basis. Contract rates quoted on request.

AN ADVERTISING INCH is measured 7/8 inch vertically on one column, 3 columns—30 inches to a page.

EQUIPMENT WANTED or FOR SALE ADVERTISEMENTS acceptable only in Displayed Style.

$2.10 a line, minimum 3 lines. To figure advance payment count 5 average words as a line.

BOX NUMBERS count as one line additional in undisplayed ads.

DISCOUNT of 10% if full payment is made in advance for four consecutive insertions of undisplayed ads.

Send NEW ADVERTISEMENTS or Inquiries to Class. Adv. Div. of Engineering News-Record, P. O. Box 12, N. Y. 36, N. Y. December 19th issue closes December 9th.

REPLIES (Box No.): Address to office nearest you
c/o This publication Classified Adv. Div.
NEW YORK: P. O. Box 12 (36)
CHICAGO: 520 N. Michigan Ave. (11)
SAN FRANCISCO: 68 Post St. (4)

WORK WANTED

Surveying Party-experienced, fully equipped contract or per diem, licensed, any location. WW-6681, Engineering News-Record.

Structural Engineer Free lance will do your structural design, buildings, bridges, hydraulic structure etc. Contract or part time basis. WW-6697, Engineering News-Record.

FOR SALE

Numbered Valve Markers manufactured for eng'rs & contractors. Free catalog, samples. Seton Nameplate Co., New Haven 15, Conn.

WANTED

Anything within reason that is wanted in the field served by Engineering News-Record can be quickly located through bringing it to the attention of thousands of men whose interest is assured because this is the business paper they read.

CONTRACT WORK WANTED

Design, specifications, contract drawings, for all types of simple, continuous, and long span bridges. Tight time schedules met. Professional Engineers. Bridgeway Associates, 127 Liberty St., N.Y.C.

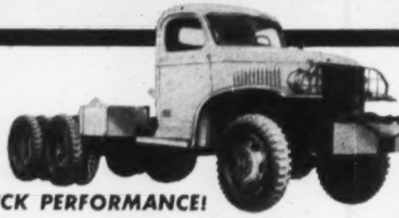
STRUCTURAL ENGINEERING
ARCHITECTURAL ENGINEERING
OUR COURSES [illegible] HAVE HELPED THOUSANDS [illegible]
[illegible]
WILSON *Engineering Corp*
College House Offices HARVARD SQ. CAMBRIDGE MASS.

Contractors School

NAME ....
ADDRESS ....
CITY ....

Learn how to figure labor, material costs on construction jobs. Write for 30 day free trial. CONTRACTOR'S SCHOOL, Box 12, Dallas, Tex.

GMC 6x6 NAMED ARMY'S BEST ALL-AROUND TRUCK!



- Extra Pull Power!
- Double Traction for Mud!
- Special "Off Road" Design!

UNUSED!

GUARANTEED! NEW-TRUCK PERFORMANCE!

From Government Storage — these all-wheel-drive GMC 2½ ton 6x6's were specially designed by the U. S. Army to take the roughest terrain in all kinds of weather. These unused 6x6's can do the same job for you in all your truck jobs; whether in a muddy field or along a super highway. Processed—by Memphis Equipment Company—down to the last bolt to assure you of receiving the finest unused GMC 2½ ton 6x6 trucks available today. Parts available anywhere in the nation.

For specifications, prices, delivery—write, wire or phone collect—JAckson 5-7841

MILTON Y. TOOMBS, JR. Sales Manager

MEMPHIS EQUIPMENT Company

ARMY TRUCKS • PARTS
CONSTRUCTION EQUIPMENT
766 SO. THIRD STREET • MEMPHIS, TENNESSEE

SHOVELS - DRAGS - CRANES - DRILLS - EUCLIDS

120-B Bucyrus Erie 4 yd. Elec. Shovel
88-B Bucyrus Erie 4 yd. Standard Shovel
1201 Lima 3½ yd. Standard Shovel
80-D Northwest 2½ yd. Standard Shovel
K-580 Link Belt 2½ yd. Shovel
51-B Bucyrus Erie 2 yard Shovel
38-B Bucyrus Erie Shovel-Crane
Unit 1020 ¾ yard Shovel
4500 Manitowoc Drag, 120', 5 yd.
2400 Lima Drag, 120', 6 yd.
111-M Marion Drag, 100', 4 yd.
1201 Lima Drag, 85', 3 yd.
3500 Manitowoc Drag, 85', 2½ yd.
54-B Bucyrus Erie Drag, 85', 2½ yd.
Also, various smaller Shovels & Drags
Truck Cranes—Lorain, Bay City, P & H, Link Belt
600 Reich Heavy Truck Mounted Rotary Air Drills
Mayhew Rotary Air Drills
Pioneer Continuous Portable Rubber-tired Mixing Plant—used one year
Scrapers, Dozers, Front End Loaders

FRANK SWABB EQUIPMENT CO., INC.
313 Hazleton Nat'l. Bank Bldg.
Hazleton, Pa. GLadstone 5-3658

MINE DETECTORS—$30.⁰⁰ each

(COMPLETE WITH CARRYING CASE—LESS BATTERIES)
F.O.B. NEW YORK

ORIGINAL COST
$350.⁰⁰

IDEAL FOR DETECTING METALS UNDERGROUND, SUCH AS: GAS PIPES, WATER PIPES, SEWER PIPES, ETC., & ALL METAL OBJECTS

J. J. EDELSON
654 BROADWAY
NEW YORK 12, N. Y.
PHONE AL 4-3086

RAILS-TIES

TRACK ACCESSORIES
NEW and RELAYING

RAILS
NEW — RELAYING — TRACK ACCESSORIES
• • MIDWEST STEEL CORP.
502 DRYDEN STREET
CHARLESTON, W. VA
IMMEDIATE DELIVERY

DON'T WAIT WF-H BEAMS PILE SECTIONS

NEW · USED · IN STOCK

8"	BP	36#
10"	BP	42#
12"	BP	53#
14"	BP	73#
14"	BP	89#
14"	BP	102#
14"	BP	117#

We are also interested in purchasing your surplus material.

We assure you our prices will be the best obtainable.

Call HY DRACHMAN STEEL CORPORATION
52-25 2nd Street
Long Island City, N. Y.
Phone: RAvenswood 9-1262

LORAIN MODEL L50 BACKHOE ATTACHMENT

Used one week. Excellent value. Offered subject to prior sale or disposition.

L. B. SMITH, INC.
357 W. Fayette St. Syracuse, N. Y.
Phone GRanite 5-2196

FOR SALE
MANITOWOC MODELS 3500 & 3900
Liftcranes
Forsythe Equipment Co., Inc.
37-11 Vernon Blvd.
Long Island City 1, N. Y.

FREE

Latest list of used construction and industrial equipment. Shows PRICES and complete description. Send for your copy today.

SPECIAL

MICHIGAN C16 BACKHOE—$7650.00

2020 Erie Ave. BA. 9-1950 Phila., Pa.

SERVICE SUPPLY CORPORATION

PIPE

Surplus New & Used
FOR SALE

ALBERT PIPE SUPPLY CO., INC.

PILING • PIPE • CULVERTS • VALVES & FITTINGS

ASBESTOS CEMENT PIPE • ALUMINUM PIPE

103 VARICK AVE., BROOKLYN, N. Y. • HY 7-4900

EST. 1904

DAVIDSON PIPE COMPANY INC.

One Of The Largest Stocks In The East

Seamless and Welded ⅛" to 26" O.D. All wall thickness Manufactured. Specialty large sizes. Cutting — Threading — Flanging — Fittings — Valves.

Call GEdney 9-6300
50th St. & 2nd Ave., B'klyn 32, N. Y.

GLOBE PIPE & FITTING CO.

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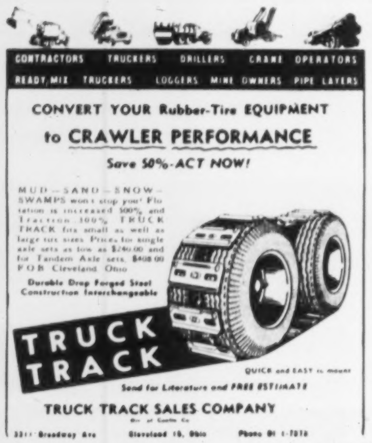
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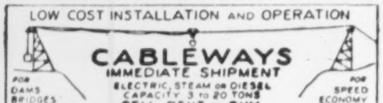

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Secrecy Hurts Progress

It would be heartening to believe that the federal government's rush to "tell all" about our progress in missiles and rockets following the Sputnik launching heralded a basic change of attitude toward secrecy. If that should not be the case, it will be a pity. For progress depends upon a sharing of knowledge, and too much secrecy holes up knowledge in the minds of the few.

Since the war, the fetish of secrecy has been so enthroned in the halls of bureaucracy as to become almost a cult. And as in all cults the practitioners see only the good and are blind to the harm. The harm in this case is that secrecy hurts progress.

Right now there is a demand that the high schools and the colleges put more emphasis on science. Yet how many teachers have had the opportunity—because of secrecy—to become familiar enough with some of the really modern aspects of the subject to teach it intelligently? For that matter the students themselves are so in the dark about the meaning of science and its importance in everyday life that they have had no enthusiasm to take the courses which are offered.

There is also strong reason to believe that secrecy has actually slowed our own scientific progress in the realm of national security. Scientists have many times complained of their inability to exchange views with their colleagues because some were working on one project and some on another, and all were forbidden to talk about them. A line of thinking or a successful result in one field, were it known in another field, might have saved a year of fruitless experiment and study.

National security is also endangered when the public is left in doubt as to what measures are being taken for its safety. Revelation by our sister publication Aviation Week that we had a missile tracking station at Samsun, Turkey, was recently charged with being a violation of secrecy. Secret from whom? Not the Russians, for they knew full well about the installation just as they do about others that we still class as secret. A little less secrecy would generate a vastly improved mental attitude than that which greeted Sputnik with such alarm.

Secrecy also takes its toll in the more mundane affairs of engineering and construction. Because they were not given and could not get essential information, several of the public utilities, which started so hopefully to develop nuclear power plants, have been faced with delays and rising costs that have at times threatened their continuing with the work. In all too many instances, the necessary information had been classified secret at a time when national security considerations made secrecy imperative, but had never been de-classified.

Because the idea of secrecy, once it is embraced, is so readily applied, civil engineering and construction knowledge have also suffered unnecessarily. Engineers have had to design structures they have never seen, even though similar structures are in existence somewhere where secrecy has been imposed. Contractors have been in the same predicament. When this has not been the situation, the same engineers and contractors have been repeatedly engaged to handle a special type of structure because they have the necessary security clearance and it would be too difficult to bring others in under the blanket. This may be good for the lucky engineers and contractors, but it is not conducive to the introduction of new ideas or the spread of knowledge, which might spell progress.

Many interesting and instructive jobs have never been described in the technical press because someone classified them as secret—too often for a specious reason. A classic case is the airbase at West Point which was kept under wraps during the entire construction period, and then publicized on completion day with a gala inauguration.

The point is that secrecy has been used for many purposes other than absolute necessity. We are reaping the consequences in a poorly informed public and shortchanged technical profession. The realization, which came with the Sputniks—that secrecy hurts progress—could be very beneficial. It may not be, but if every one would object whenever he is faced with what seems senseless secrecy there could be less of it. The climate for such objection is better now than it has been at any time since the war.

Patience on Road Program

Out of the welter of statistics, opinions and argument that have so far surrounded the huge interstate highway program, an evaluation by ENR's E. E. Halmos, Jr., in the Nov. 21 issue, has finally pointed to a clearly defined yardstick for measuring progress.

And with this definition of a means of measurement many hitherto unexplainable developments can be seen in proper perspective. Thus, the program can be actually on schedule, yet have produced relatively little new business for the construction industry as a whole.

One thing that stands out above all else is the need for patience. It is characteristic of Americans to expect everything to be done at once, and it is not surprising that the general public should be impatient to see and drive on the new roads.

Construction men and their suppliers are impatient too—and used to doing the difficult as quickly as possible. But they should know better than most that "to do the impossible takes a little time." Given time, reason and teamwork, the new roads will certainly produce much of the expected upsurge in business, and prove to the general public the wisdom of its investment.

The Equipment Superintendent of the Ohio Turnpike shows how easily the test is made.

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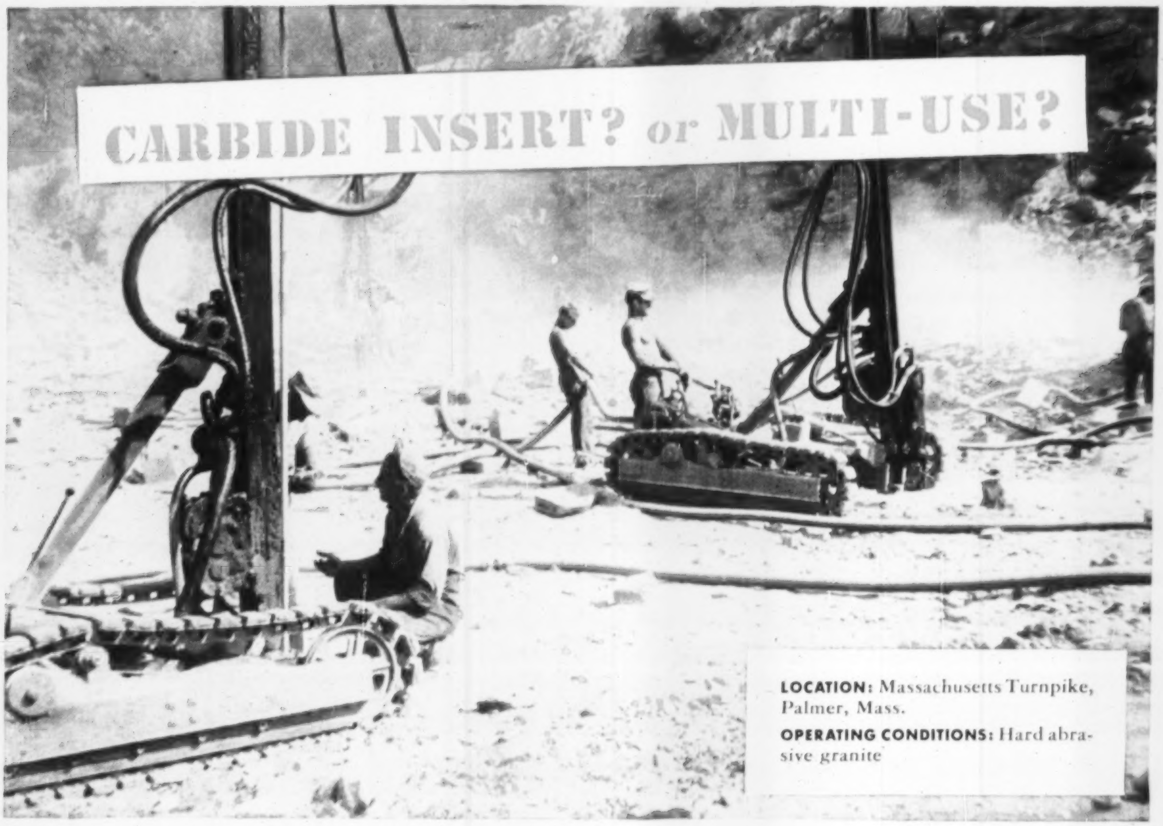

LOCATION: Massachusetts Turnpike, Palmer, Mass.

OPERATING CONDITIONS: Hard abrasive granite

Grandview Construction Corporation speeds deep hole drilling on Mass. Turnpike with Timken® carbide insert bits

GRANDVIEW Construction Corporation had to drill extremely deep holes through hard abrasive granite on its sections of the 123-mile Massachusetts Turnpike. To get speediest drilling at the most economical cost, Grandview used Timken® carbide insert bits. They got maximum production, kept bit cost per foot-of-hole at rock bottom.

For economical drilling in hard, abrasive ground, Timken carbide insert bits are your best bet. But carbide bits may not be the best choice for *every* job.

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